Asian Health Benchmarking Technical Report for Waitemata and Auckland DHBs

(supplement to the International Benchmarking of
Asian Health Outcomes for Waitemata DHB and Auckland DHB Report)

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AUCKLAND DISTRICT HEALTH BOARD
Te Toka Tumai

Waitemata District Health Board
Best Care for Everyone

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List of Abbreviations

ARR	Annualised Rate of Reduction
ATEED	Auckland Tourism, Events and Economic Development
AUT	Auckland University of Technology
BMI	Body Mass Index
CALD	Culturally and linguistically diverse
CBD	Central Business District
CHAG	CALD Health Reference Group
CI	Confidence Interval
CME	Continuing Medical Education
CNE	Continuing Nursing Education
CVD	Cardiovascular Disease
DALYs	Disability-adjusted Life Years
DHB	District Health Board
ECHO	Ending Childhood Obesity
ED	Emergency Department
GBD	Global Burden of Disease
GP	General Practitioner
HNA	Health Needs Assessment
ICD	International Classification of Disease
IGME	Inter-agency Group for Child Mortality Estimation
IHME	Institute for Health Metrics and Evaluation
INFoRM	Inter-Agency Network for Refugees and Migrants
INZ	Immigration New Zealand
MDG	The Millennium Development Goal
MELAA	Middle Eastern, Latin American and African
MIPEX	Migrant Integration Policy Index
MMR	Maternal Mortality Ratio
MoH	Ministry of Health
MOPS	Maintenance of Professional Standards
NGO	Non-Government Organisation
NHS	National Health System
NRRS	National Refugee Resettlement Strategy
NSW	New South Wales
NZ	New Zealand
NZHS	New Zealand Health Survey
OECD	Organisation for Economic Co-operation and Development
OR	Odds Ratio
PBU	Primary Birthing Unit
PHO	Primary Health Organisation
RSSG	Regional Settlement Steering Group
SDGs	Sustainable Development Goals
SRR	Standardised (mortality) Rate Ratio
TANI	The Asian Network Inc.
UI	Uncertainty Interval
UK	United Kingdom
UN	United Nations
UNICEF	United Nations Children's Emergency Fund
UoA	University of Auckland
US	United States of America
WHO	World Health Organization
YLD	Years Lived with Disability
YLL	Years of Life Lost

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Background & Scope

An International Benchmarking of Asian Health Outcomes for Waitemata and Auckland District Health Boards (DHBs) report has been developed to profile and assess the health of Waitemata and Auckland districts' Asian population in an international context – considering their health status against our high level outcomes to maximise life expectancy and reduce inequalities in health outcomes. This Asian Health Benchmarking Technical Report is a supplement resource which details results and analyses not included in the main Asian International Benchmarking report. The report covers the following sections:

1. Qualitative findings from an international health literature analysis for:
    - Monitoring Asian and migrant health
    - Policy and legal frameworks affecting Asian and migrant health
    - Asian and migrant sensitive health systems including service access and utilisation, and the health workforce, and
    - Networks, partnerships and multi-country frameworks on Asian and migrant health
2. Population profile of Asian in Waitemata and Auckland DHBs, and other countries
3. Health outcomes, health risk factors and prevention, and health service use
4. Social progress indicators.

Most countries in Europe do not routinely collect health data by migrant status, in contrast to the practice in Australia, Canada, New Zealand and the United States (World Health Organization, 2011). Singapore, Australia, Canada and the UK have higher migrant populations or a higher share of migrants in their total populations according to the Migration Policy Institute (Migration Policy Institute, 2010). In addition, China, India and South Korea ('South Korea' and 'Republic of Korea' are used interchangeably in this report) will also be included as they are the major origin countries of the Asian peoples in Waitemata and Auckland DHBs and in New Zealand.

Table 1 Countries included in the report

Country	Reason for being included as a comparator	Income level	Migrant status or ethnicity data or proxy	Population group to be used for comparison
Australia	Neighbour of New Zealand and with higher immigration population	High income	Available	National data, Asian data when available
Canada	Higher immigration population	High income	Available	National data, Asian data when available
The UK	Higher immigration population	High income	Available	National data, Asian data when available
Singapore	Higher immigration population	High income	Mainly Chinese and Indian	National data
Korea	Korean, origin country	High income	Korean	National data
China	Chinese, origin country	Developing country	Chinese	National data
India	Indian, origin country	Developing country	Indian	National data

Methods

Literature sources

- The literature review focused on studies of Asian and migrant health from a series of comparable countries (Australia, Canada, China, India, Korea, New Zealand, Singapore, UK and US). Searches for relevant articles were conducted on Medline, PubMed, Scopus, Grey Literature, Web of Science and Google Scholar between November 2015 and February 2016. In addition, the websites of the World Health Organization (WHO) and Migrant Integration Policy Index (MIPEX) were searched. The following combinations of keywords were used to identify relevant articles: [(Specific Country, e.g. Australia) AND (monitor OR Surveillance OR trends OR ethnicity data OR health status)] AND (Migrant OR Asian)
- [(Specific Country) AND (policy OR entitlement OR legal framework OR law OR regulation)] AND (Migrant OR Asian)
- [(Specific Country) AND (culturally competent OR work force OR access OR responsive OR cultural support OR diversity)] AND (Migrant OR Asian).

Disease burden metrics

The World Bank commissioned the first Global Burden of Disease (GBD) study for its World Development Report 1993, in collaboration between the Harvard School of Public Health and the World Health Organization. The Bill & Melinda Gates Foundation provided funding for a new GBD 2010 study in 2007, led by the Institute for Health Metrics and Evaluation at the University of Washington, in collaboration with WHO, Harvard University, Johns Hopkins University, and the University of Queensland (WHO, 2013). Most recently, papers were published in the Lancet, based on the new round of study – GBD 2013 (Murray, 2015) (Global Burden of Disease Study 2013 Collaborators, 2015) (GBD 2013 Risk Factors Collaborators, 2015). New Zealand and Australia have also produced burden of disease reports (MoH, 2012) (AIHW, 2015).

There were substantial differences in some areas between the GBD 2010 and the WHO/UN Interagency groups, but in many other areas the results were quite similar. However, when the WHO report was released in November 2013, it did not endorse the GBD 2010 results before they had the opportunity to review and assess the reasons for differences, pending the availability of more detailed information on the data. It is also not known whether WHO will endorse the results of GBD 2013, which have made some changes or improvements since GBD 2010. However, the concepts of disease burden are the same between the two sets of methods.

Disability-adjusted life year (DALY) is a summary measure combining time lost through premature death and time lived in states of less than optimal health, referred to as 'disability'. One DALY can be thought of as one lost year of 'healthy' life and the measured disease burden is the gap between a population's health status and that of a normative reference population (WHO, 2013). DALYs for a cause is calculated as the sum of the Years of life lost (YLL) from that cause and the Years lived with disability (YLD) for people living in states of less than good health resulting from the specific cause:

DALY= YLL + YLD for a specific cause or all causes.

Box 1 Key terms used in burden of disease studies (AIHW, 2015)

Attributable burden: The disease burden attributed to a particular risk factor. It is the reduction in burden that would have occurred if exposure to the risk factor had been avoided.

Disability-adjusted life year: One (1) year of healthy life lost, either through premature death or, equivalently, through living with ill health due to illness or injury.

Incidence: The number of new cases (of an illness or event) occurring during a given period.

Prevalence: The number of cases of a disease or injury in a population at a given time.

Years lived with disability: A measure of the years of what could have been a healthy life that were instead spent in states of less than full health. YLD represents non-fatal burden.

Years of life lost: Years of life lost due to premature death. YLL represents fatal burden interchangeably termed 'fatal health loss'.

WHO adopted the simplified calculation methods for DALYs in late 2012 as described below (WHO, 2013):

- Use of a new normative standard life table for the loss function used to compute YLLs
- Calculation of YLDs simply as the prevalence of each sequela multiplied by the relevant disability weight
- Adjustment for comorbidity in the calculation of YLDs
- No discounting for time or unequal age weights.

The report adopted the WHO methods for calculating mortality and YLL rates for Waitemata DHB, Auckland DHB and New Zealand, using the WHO standard life table (standard loss functions), WHO World standard population (2000-2025) for age standardisation, WHO/GHE cause categories and ICD 10 codes, the WHO method of redistribution of garbage disease cause codes and adjustment for incompleteness of death registrations.

WHO/GHE cause categories and ICD 10 codes

The death cause categories and names used by WHO for global burden of disease and global cause of death were used in the analysis for this report (WHO, 2013). The first level cause categories are as follows:

1. Communicable, maternal, perinatal and nutritional conditions
2. Non-communicable diseases
3. Injuries.

Appendix 1 shows the cause categories and their associated ICD 10 codes. Some ICD 10 codes are not the underlying cause of death and these codes are referred to 'garbage codes'. These codes have to be redistributed to other cause categories and their associated codes. Three groups of ICD codes were redistributed in the analysis following the WHO methods (WHO, 2013):

- Cancer deaths coded to ICD categories for malignant neoplasms[1] of other and unspecified sites (ICD-10 C76, C80, C97) were redistributed pro-rata across the malignant neoplasm categories excluding liver, pancreas, ovary and lung within each age–sex group
- Injury deaths where the intent is not determined (ICD-10 V00, Y10-Y34, Y872) are distributed proportionately to all causes below the group level for injuries
- Deaths coded to 'Symptoms, signs and ill-defined conditions' (ICD-10 R00-R99) are distributed proportionately to all causes within Group I 'Communicable, maternal, perinatal and nutritional conditions', and Group II 'Non-communicable diseases'

Years of life lost and age standardisation

There have been some debates about the use of standard life table based on the currently observed death rates as it is believed that there are still a proportion of deaths that are potentially preventable or avoidable by reducing health risks, severe injuries and appropriate use of health care services. WHO has chosen to use a standard life table based on the frontier national life expectancy projected for the year 2050 by the World Population Prospects 2012 (WHO, 2013). Appendix 2 shows the standard expected years of life lost by individual year. This is the approach adopted in this report.

To control for the confounding effects of age, the WHO standard population (Appendix 3) was used in the analysis for YLL and mortality rates by ethnicity (prioritised ethnicity level 1 and level 2) and geography (Waitemata DHB, Auckland DHB and New Zealand). New Zealand mortality data and their associated population estimates for 2010-2012 were used.

DALYs and YLDs are not included in the comparison/ranking at DHB level due to the necessary epidemiological data not being available for Asians and their sub-groups in both DHBs and the potentially large discrepancy between data sources.

At country level, the disease burden metrics were extracted for the year 2010 (termed as 'GBD 2010' in this report) from the Viz Hub of the Institute for Health Metrics and Evaluation (IHME) (IHME, 2016). Acknowledging the potential differences of the methods for mortality and YLL rates between the WHO and the IHME (GBD 2010 and 2013), we used the New Zealand average for adjusting the discrepancy when comparing the health outcomes of Asians in the two DHBs with the metrics at country level. There may still be residual biases, but the comparisons aimed to look at the rank rather than the absolute values and is thus thought to be relatively robust.

Maternal health

Maternal mortality ratio (MMR) measures the number of maternal deaths per 100,000 live births. The fifth Millennium Development Goal (MDG 5) established the goal of a 75% reduction in the MMR between 1990 and 2015. The GBD 2013 study used their cause of death database (1980-2013) to estimate MMR (Kassebaum, 2014).

[1] Malignant and non-malignant neoplasms are referred to as 'cancers' in the main International Benchmarking of Asian Health Outcomes for Waitemata and Auckland District Health Boards report

There is much debate about which deaths of women of reproductive age should be included as maternal deaths. The GBD 2013 study classifies the death to be maternal only if the associated pregnancy was a causal factor in death, which includes direct effect (complications of the pregnancy or childbirth, or postpartum complications) or indirect effect (exacerbation of a pre-existing condition). It means accidental or incidental deaths in which pregnancy had no causal role are not included as maternal deaths. In summary direct and indirect deaths during pregnancy and within 6 weeks of delivery, plus late maternal deaths up to 1 year after delivery and the fraction of HIV-related deaths aggravated by pregnancy were included. The Cause of Death Ensemble model (CODEm) was used to model maternal mortality by age.

The 'Ninth Annual Report of the Perinatal and Maternal Mortality Review Committee: Reporting mortality 2013' published by the New Zealand Perinatal and Maternal Mortality Review Committee (PMMRC), looked thoroughly at perinatal and maternal mortality in 2013 and neonatal encephalopathy 2010–2013. In this report, a maternal related death is 'death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes' based on the WHO definitions from the International Classification of Diseases (10th edition).

The cause of each death is classified further using the Confidential Enquiry into Maternal and Child Health (CEMACH) classification system: 1) Direct maternal deaths: those resulting from obstetric complications of the pregnant state (pregnancy, labour or puerperium), from interventions, omissions, incorrect treatment or from a chain of events resulting from the above; 2) Indirect maternal deaths: those resulting from previous existing disease or disease that developed during pregnancy and was not due to direct obstetric causes but that was aggravated by the physiologic effects of pregnancy. All maternal deaths by suicide are included in the New Zealand data as indirect deaths; 3) Coincidental maternal deaths: deaths from unrelated causes that happen to occur in pregnancy or the puerperium (PMMRC, 2015). This means the late maternal deaths between 42 days and one year following the birth were excluded from the report, which is different from the GBD 2013 maternal mortality analysis.

In addition, New Zealand also defined MMR as the number of maternal related deaths per 100,000 maternities, and maternities are defined here as 'all births at 20 weeks or beyond or weighing 400g or more if gestation was unknown'. Because of the difference of MMR between PMMRC and the GBD 2013 study, direct comparisons would be difficult. No calculations were made for MMR by ethnicity at DHB level due to very small numbers.

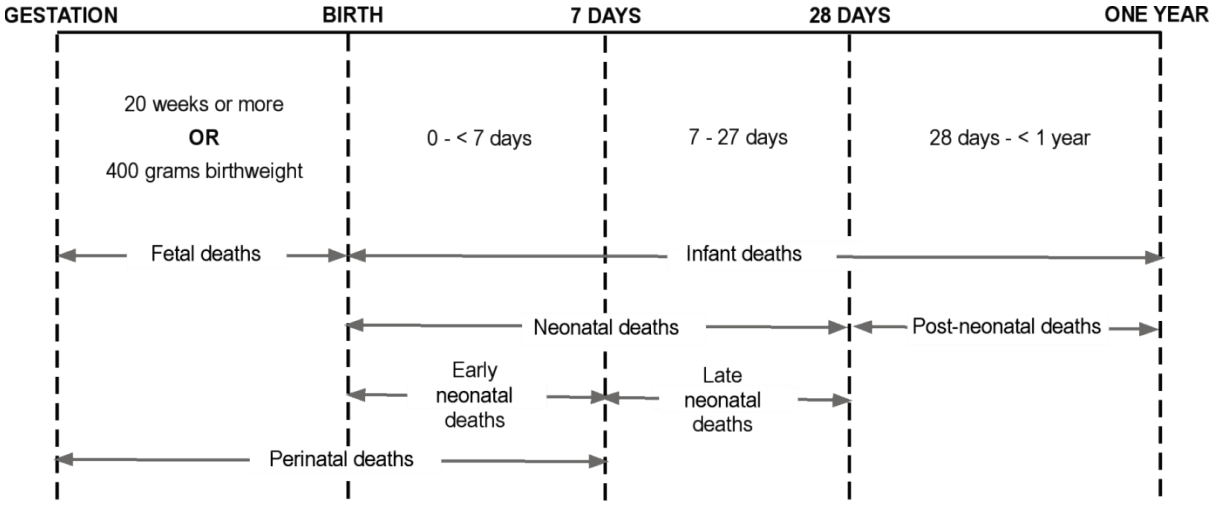
The low birth weight rate at population level is an indicator of a public health problem that includes long-term maternal malnutrition, ill health and poor health care of the women giving births. Low birth weight is also an important predictor of new-born health and both short and long-term survival. There is evidence linking low birth weight with subsequent adulthood obesity, diabetes and other chronic conditions. Low birth weight is defined as a weight of less than 2500g (up to and including 2499g) irrespective of gestational age and the measurement should be taken within the first hours of life, before significant postnatal weight loss has occurred (Ministry of Health, 2015).

Child mortality is a core indicator of child health and well-being. The fourth Millennium Development Goal (MDG 4) target was to reduce the under-five mortality rate by two thirds

between 1990 and 2015. The United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) composed of representatives from the United Nations Children's Fund, the World Health Organization, the World Bank and the United Nations Population Division updates child mortality estimates annually. The most recent report produced by the UN IGME (UN IGME, 2015) provided infant and child mortality data for the countries of interest.

Under-five mortality rate (U5MR) estimates were produced using the Bayesian B-spline Bias-reduction model (the 'B3 model'). A variation of the B3 model was used to obtain infant mortality rates for countries with high-quality vital registrations, while the infant mortality rate (IMR) is derived from the U5MR through the use of model life tables that contain known regularities in the age patterns of child mortality for countries without high quality vital registration data.

An infant death is a live-born infant dying before the first year of life is completed according to WHO (UN IGME, 2015). Infant deaths comprise early neonatal deaths, late neonatal deaths and post-neonatal deaths. Infant death rate is the number of infant deaths per 1000 live births over a particular time period (usually annually).



Data source: http://www.health.govt.nz/publication/fetal-and-infant-deaths-2012, accessed 23 March 2016

Figure 1 Time periods for foetal and infant deaths

Risk factors

GBD 2013 estimates the burden of disease attributable to risk factors in three categories at Level 1: 1) behavioural, 2) environmental, and 3) metabolic. At its level 2, the risk factors are as follows:

Table 2 Risk factors included in GBD study

Low glomerular filtration rate	Air pollution
Low bone mineral density	Unsafe sex
High total cholesterol	Tobacco smoke
High systolic blood pressure	Sexual abuse and violence
High fasting plasma glucose	Low physical activity
High body-mass index	Dietary risks
Unsafe water, sanitation, and hand washing	Child and maternal malnutrition
Other environmental risks	Alcohol and drug use
Occupational risks	

The fifth in a series of WHO reports tracking the status of the tobacco epidemic and the impact of interventions implemented to stop it, 'WHO report on the global tobacco epidemic, 2015: Raising taxes on tobacco' provided comparable prevalence estimates of smoking in 2013 (WHO, 2015). WHO reported 4 metrics of smoking, which are defined below:

Table 3 Definitions of smoking used by WHO

Current Tobacco Smoking	"Current" means smoking at the time of the survey, including daily and non-daily smoking. "Tobacco smoking" means smoking any form of tobacco, including cigarettes, cigars, pipes, hookah, shisha, water-pipe, etc. and excluding smokeless tobacco.
Daily Tobacco Smoking	"Daily" means smoking every day at the time of the survey. "Tobacco smoking" means smoking any form of tobacco, including cigarettes, cigars, pipes, hookah, shisha, water-pipe, etc. and excluding smokeless tobacco.
Current Cigarette Smoking	"Current" means smoking at the time of the survey, including daily and non-daily smoking. "Cigarette smoking" means smoking any form of cigarette, including manufactured and roll-your-own.
Daily Cigarette Smoking	"Daily" means smoking every day at the time of the survey. "Cigarette smoking" means smoking any form of cigarette, including manufactured and roll-your-own.

WHO used a statistical model based on a Bayesian negative binomial meta-regression to derive modelled crude rates for the four indicators of tobacco smoking for countries by sex. Age-specific rates derived were used to generate the age-standardized estimates using WHO standard population, and 95% credible intervals were reported as well. Countries may report different indicators across surveys from time to time. Where data were missing for any indicator, the model used available data from the country's other surveys to estimate the missing information. The average relationships seen in other countries in the same geographical region are applied to the country's data, if the indicator has never been reported in that country.

There are two main sources of data regarding smoking rates for adults (15+ years) at DHB level in New Zealand, i.e. Census 2013 data and New Zealand Health Survey (NZHS). The Ministry of Health New Zealand has produced smoking rates by level 1 ethnicity for larger DHBs using pooled NZHS 2011-13 data, to overcome the issue of small numbers in statistical analysis. In the present analysis, the smoking rates based on Census 2013 are used mainly so that the smoking rates by Asian sub-group can be calculated. Census Usually Resident (CUR) populations were used for the smoking rate estimations. The current smoking and daily smoking rates from NZHS 2011-13 are also provided for comparison and completeness. The smoking rate based on Census 2013 is calculated as a percentage of 'regular smokers'. The definitions related to smoking in Census 2013 are listed below:

- Regular smoker – Someone who actively smokes one or more manufactured or hand–rolled tobacco cigarettes per day
- Never smoked – Someone who never actively smoked manufactured or hand rolled tobacco cigarettes at all or never actively smoked one or more per day
- Ex-smoker – Someone who is not a regular smoker now but has been a regular smoker of one or more cigarettes in the past.

'Regular smoker' in Census 2013 is very close to the definition of 'daily smoking' in NZHS.

Overweight and obesity, modifiable risk factors for health, are defined as 'abnormal or excessive fat accumulation that may impair health' according to WHO (WHO, 2016). Obesity is defined as a person's body mass index (BMI) of 30 kg/m^2 or higher for an adult. Obesity rate is the percentage of a defined population with body mass index (BMI) of 30 kg/m^2 or higher. The WHO's definition of overweight is a person's BMI greater than or equal to 25 but less than 30 kg/m^2 for an adult.

Social Progress Index

The Social Progress Index offers a 'rich framework for measuring the multiple dimensions of social progress, benchmarking success, and catalysing greater human wellbeing' (Social Progress Imperative, 2016). The index is designed based on four principles, namely exclusively social and environmental indicators, outcomes rather than inputs, holistic and relevant to all countries, and also actionable. There are three dimensions of social progress included at country level in the Social Progress Index Framework (Appendix 4), which are: 1) basic human needs, 2) foundations of wellbeing, and 3) opportunity, so that these three questions can be answered properly:

- Does a country provide for its people's most essential needs?
- Are the building blocks in place for individuals and communities to enhance and sustain wellbeing?
- Is there opportunity for all individuals to reach their full potential?

There are four components for each dimension of the framework and for each component there are three-five specific outcome indicators. The overall Social Progress Index score is a simple average of the three dimensions; and each dimension is the simple average of its four components. 'Principal component analysis' is used to identify the components using the outcome indicators within each component of the Social Progress Index framework.

It is particularly important for migrants to live in a harmonious and inclusive social and political environment, in addition to general physical and mental health. In the framework, the last but not least dimension, opportunity, "measures the degree to which a country's citizens have personal rights and freedoms and are able to make their own personal decisions as well as whether prejudices or hostilities within a society prohibit individuals from reaching their potential". Access to advanced education is essential to migrants and creates abundant opportunities for individual and social development.

Social Progress Index scores at the overall level, dimension level, and component level are all based on a 0-100 scale.

Definitions

Terms not defined elsewhere are defined below:

Table 4 Definitions used in the report

Term	Definition
Asian	People originating from Asian countries including countries in West Asia (Afghanistan and Nepal), South Asia (covering the Indian sub-continent), East Asia (covering China, North and South Korea, Taiwan, Hong Kong, Japan), and South East Asia (Singapore, Malaysia, the Philippines, Vietnam, Thailand, Myanmar, Laos and Cambodia). This definition is commonly used within the health sector and is the basis of the Statistics New Zealand Asian ethnicity categories.
Cancer	In this document we have used the term 'cancer' to refer to all neoplasms that may be benign (not cancer), or malignant (cancer).
CALD populations	Culturally and linguistically diverse populations from Asian, Middle Eastern, Latin American and African backgrounds.
Fatal health loss	Fatal health loss refers to the measure of YLLs.
Health loss	Health loss refers to the measure of DALYS.
MELAA	Middle Eastern, Latin American and African groups.
Migrants	People who were born overseas who settle in New Zealand (also known as immigrants).

Refugees	Any person who, owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his/her nationality and is unable, or owing to such fear, is unwilling to avail himself/herself of the protection of that country[2]. Refugees arrive in New Zealand under one of three categories: ▪ Quota refugees ▪ Family reunification members ▪ Asylum seekers.
Total dependency ratio	The total dependency ratio estimates the burden of the dependent populations (the number of children (0-14 years old) and older persons (65 years or over)) by the working-age population (15-64 years old)3, which is related to social and economic development, and has implications for social support needs and use of health care services.

Caveats and limitations

Literature review

1. The Asian cohort is often described as a subset of the country's migrant population or ethnic minorities, instead of being categorised as its own separate entity. As a result, the qualitative literature resources on Asian health in the comparable countries were limited. A second search round with inclusion of 'migrant' as a search word was incorporated into the method, in order to expand the scope of the search and draw comparable findings from the literature.
2. Apart from the comparator countries (Australia, Canada, UK and US), there were difficulties in finding literature from China, India, Korea and Singapore. These difficulties include language differences and literature from these countries not being readily published on the search databases accessed.
3. The majority of the literature sourced focused on pilot studies on a specific disease outcome. This had limitations in terms of generalisability or transferability at a national, regional or sub-regional level for a targeted Asian ethnic group, though the findings were interesting to note for identified Asian ethnic groups.

Analysis of health outcomes

The report used a wide range of data sources and the data may come from different years for the same indicator. For the health outcomes and all cause disease burdens attributed by the health risk

[2] United Nations Convention Relating to the Status of Refugees (1951). United Nations Conference on the Status of Refugees and Stateless Persons, Article 1. Geneva.
[3] Dependency ratio. http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/demographics/dependency_ratio.pdf, accessed 12 April 2016

factors, the data of the four metrics namely, mortality rate, DALY rate, YLL rate and YLD rate, were mainly extracted from the GBD study and Global Health Estimates/WHO, at country level. At DHB level and by ethnicity, only mortality rate and YLL rate were estimated based on robust death data, using the WHO methodology. There are differences to some degree in cause definition by ICD codes, standard life table, World standard population and redistribution of 'garbage codes' between the GBD study and the WHO method in calculating mortality and YLL rates. In addition, there are many data gaps particularly for Asians residing in migrant countries Australia, Canada and the UK as ethnicity has not been systematically collected and reported in their national systems such as birth or death registrations.

Nevertheless, the report attempts to provide an international context for the performance of Asian health of Waitemata and Auckland DHBs, to identify the areas of high and low performance, issues, unmet need, and experiences and expectations of Asian health service users.

Literature review

This section of the report includes recent international and national literature on Asian and migrant health monitoring, policy, programmes and partnerships for benchmarking purposes in the following areas:

- Monitoring Asian and migrant health
- Policy and legal frameworks affecting Asian and migrant health
- Asian and migrant sensitive health systems including service access and utilisation, and the health workforce
- Networks, partnerships and multi-country frameworks on Asian and migrant health.

Monitoring Asian and migrant health

Planning ahead for population health ensures that District Health Boards (DHB) address the key issues responsible for burden of disease. Accurate data on the health of Asian and migrant populations, including health determinants and utilisation of health services, are vital for monitoring and improving health services so they are accessible, culturally responsive and equitable for all population groups. This first section examines how Asian and migrant health data is collected and monitored across the comparable countries, whilst drawing on common themes about migrant health data specifically in the international literature.

Highlights

New Zealand's approach to monitoring Asian and migrant health data is comparable with the reference countries in terms of the methodology used for health data surveillance. Similar to the reference countries, New Zealand has faced many systematic issues with migrant and ethnicity coding with regards to disaggregation of migrant (into migrant variables) and ethnicity (into Asian subgroups) health data. A recent significant shift has been the updating of the Ministry of Health (MoH) Ethnicity Data Protocols for the Health and Disability Sector (2004) recommendations. Refreshed protocols support a transition from the previous minimum requirements of collecting up to three ethnicities at Level 2 classification, to collecting up to six ethnicities at Level 4 classification. This reflects the requirement for information systems to capture the greater population diversity and improved granularity of information to plan, fund and monitor health services. These changes represent a significant move forward in terms of ethnicity data collection and will make a valuable contribution to health planning. The changes will apply to the whole of the health and disability sector from July 2017.

Communicable disease monitoring

Global public health agencies have shifted focus to improving the collection of ethno-cultural data to assist with communicable disease prevention and control (Gushulak, 2010). Historically, there has been an association of labelling communicable disease risk attributed to targeted ethnic groups risk during periods of outbreak e.g. measles and tuberculosis. Consistently, New Zealand and the US experience a common trend, whereby the collection of ethno-cultural data and inclusion of the

migrant variables used in Australia have been traditionally linked to communicable disease surveillance, and not transferred over to non-communicable disease monitoring routines.

General Asian and migrant health

The 'healthy migrant effect' is a phenomenon where the health of first generation migrants is often better than the host population (Anikeeva, Bi, Ryan , Roder, & Hiller, 2010) (Argeseanu Cunningham , Ruben, & Narayan , 2008) (Gushulak, Pottie, Hatcher Roberts , Torres , & DesMeules , 2011). This phenomenon is thought to occur for a number of reasons, mainly self-selection at the time of migration and the health prerequisites and resources associated with migration. This phenomenon generally manifests as lower mortality and hospitalisation rates, as well as lower rates of disability and risk factors, such as obesity and hypertension, when compared to the domestic population of the host country. Such health advantage often deteriorates with increased length of stay as explained by the lifestyle attitudes and behaviours adopted from the host population - known as 'acculturation' (McDonald & Kennedy, 2004). In many studies, acculturation is usually crudely measured by duration of residence since the time of immigration, and it plays a major factor in modifying the social, behavioural, and health characteristics of migrants, particularly of the Asian migrant groups (Singh & Hiatt, 2006) (Arcia, Skinner, Bailey, & Correa, 1982).

In New Zealand, Asian peoples generally have good health that is comparable to the general population (SNZ, New Zealand Census , 2013). Data suggests that people of Asian ethnicity or descent, as a whole, have favourable outcomes on a range of health indicators compared to other major ethnic groups in New Zealand (Abbott & Young, 2006) and like other migrants, this health advantage may be partially accredited to the 'healthy migrant effect'. However, relative to the New Zealand European ethnic group, the Asian group as a whole has lower rates of access to health services and health care utilisation, particularly by the Chinese population (Mehta, 2012). This includes primary healthcare enrolment, uptake of screening programmes, and access to mental health services, aged residential care and disability support (Jatrana & Crampton, 2009). Possible contributors to these disparities include stigmatisation, language barriers, cultural attitudes and behaviours, understanding of the New Zealand health and disability systems, and lack of cultural competency by the health workforce (Wong, 2015).

Health data on the Asian population are often aggregated without statistical separation between Asian ethnic groups. The aggregation of Asian ethnic groups may result in the "averaging effect" which masks the actual health status of migrants in New Zealand, disguising important differences in the health needs between ethnic groups (Singh & Hiatt, 2006) (Wong, 2015). Several key health concerns for the Asian population are evident when the health data is disaggregated into the respective Asian ethnic groups. Issues include the high rates of cardiovascular disease, diabetes and low birth weight for South Asians, and high risk of stroke amongst Chinese (Mehta, 2012).

Despite the generally good health that Asians experience in New Zealand, there are barriers experienced by Asian ethnic groups where health inequities impact on their health status, they include, health system awareness and knowledge gaps, low health literacy, lower access and utilisation rates for primary care and other health services such as mental health, language, workforce cultural competency and other structural factors across the health determinants such as housing and employment.

Data on Asian and migrant health

Internationally, there is a general consensus that data on Asian and migrant health (with the exception of refugee populations) is somewhat scarce across the reference countries. The need for improved collection and recording of migrant health data has been recognised for some time. Such limitations were highlighted by the WHO Health of Migrants – The way forward report (2010) on global migrant health (Gushulak, 2010). Two key reasons for scarcity of data were a) inconsistency in ethnicity data collection compliance, and b) aggregation of ethnic subgroups whereby healthcare databases do not usually capture adequate migrant specific variables.

Methodology of migrant health status collection

Most European countries (such as France, Germany and Spain) lack routine data collection on migrant health, either through their registry data or regular surveys. However, in the UK, Canada, Australia and New Zealand, data by migrant status in healthcare utilisation registries or regular surveys are routinely collected (Rechel, 2012). The variation of migrant health data collection, particularly in Europe, is explained by the variation in how a migrant is defined (e.g. citizenship vs country of birth) (Gushulak, 2010) (Stronks, Kulu-Glasgow, & Agyemang, 2009) data security/confidentiality, and political perspectives (Rechel, 2012).

In the USA, most national data systems do not routinely report and analyse health statistics by migrant status. Collection of migrant health data is further hindered by difficulty in obtaining relevant population denominator data or by incomplete reporting of migrant status in national health surveillance databases (Singh & Hiatt, 2006). Having said this, there are eight major federal data systems that can be used to study health of US migrants in considerable detail. These data systems vary in their coverage of health and behavioural characteristics, identification of ethnic and migrant groups, and availability of time periods. Of these eight databases, two have been heralded as important benchmarks for other databases in order to understand migrant health, they are:

- National Vital Statistics System
- National Health Interview Survey

These two databases include a wide range of health variables, inclusion of various ethnic and migrant groups, and most importantly, include key immigration variables (such as migrant status, place of birth, duration of residence in the US, English proficiency, and citizenship status). Literature has described the aforementioned variables as being important factors that impact on migrant health, and therefore this level of data collection disaggregates migrant health status appropriately to account for the diversity found within migrant populations. A learning for New Zealand is the type and quality of migrant and ethnic specific data captured.

Ethnicity data

In the US, although the Affordable Care Act requires that population surveys and federally funded health programmes collect and report on ethnicity data, however, there is variable compliance depending on the state or the health insurance product (Wong, Mortensen, Lim, & Abbott, 2015).

In the UK, collection of ethnicity data is theoretically required for all patients admitted to hospital, however the recording levels are usually not over 80% (Wong, Mortensen, Lim, & Abbott, 2015) One notable feature in the UK's ethnicity data collection practice is the presence of mix race categories (Mathur, 2013). This allows the population to self-identify as being of mixed race and from multiple ethnicities, as opposed to conforming to traditional views of belonging to one homogenous ethnic group. This approach proves to be a systematically progressive way to collect ethnicity data, especially where societies are becoming increasingly more multicultural and heterogeneous. Despite these practices, available data on migrants' health in the UK, particularly on large scale quantitative levels are limited (Jayaweera, 2015). Apart from birth and death registrations, research on migrant health outcomes and access to health care is reported by ethnicity (CQ, 2010). The policy emphasis has been on improving data collection on ethnicity in health data in primary and secondary care to include 'migration variables' such as country of birth and date of arrival, which are not included in routine administrative systems.

In Australia, there has been extensive studies done on migrant health, however many were conducted more than 10 years ago or had a narrow focus based on the then ethnic specific migration trends of the country (Anikeeva, Bi, Ryan , Roder, & Hiller, 2010). Furthermore, historically most studies were focused on migrants from Italy, Greece and the former Yugoslavia which may not reflect current migration trends. Research on recently arrived migrant groups from Middle East and Africa has been particularly lacking (Anikeeva, Bi, Ryan , Roder, & Hiller, 2010).

Health data on Asians and migrants

Much of the understanding of Asian American health in the US has been derived from national health surveys, such as the National Health Interview Survey (Holland, 2012). Similarly, Canada conducts cross-sectional national and provincial surveys which are used as the main data source (Khan, 2015). However, data on the health of Asian Americans (Holland, 2012) and Asian Canadians (Khan, 2015) particularly for the Asian ethnic groups is lacking as compared to migrant health data where many health disparities for these population subgroups remain unknown. Much of the research on North American Asians have only examined one ethnic group e.g. the Ni-Hon-San Study (Takeya, 1984)on Japanese cardiovascular risk factors or categorise Asian ethnic groups into a single overarching Asian category (i.e. level 1 as similar to the Ethnicity Data Protocols for the Health and Disability Sector (2004) formulated by the MoH).

For example, historically in the US, Asian health data has been collected, reported and aggregated under a unified Asian and Pacific Islander category. Only recently (in this decade), has Asian health data been disaggregated from Pacific Islander data (Holland, 2012). Such aggregation may mask health need differences between Asian subgroups (e.g. diabetes prevalence in the Indian population), as well as making unwarranted policy extrapolation or generalisability across other Asian ethnic groups or across the Asian population as a whole e.g. extrapolation of cardiovascular risk factors onto all Asians from the Ni-Hon-San study (Holland, 2012).

Furthermore, most data fail to appreciate the diversity among these ethnic groups, without accounting for the differences in country of birth (including host country born Asians), ethnic origin, and time spent in host and home country. A recent Canadian scoping paper (Khan, 2015) published about minority health data and research in Canada argues that despite 30% of the Asian population

living in Canada are citizens by birth, there is constant blending and misuse of the terminology of 'Asians' and 'migrants'. Much of what is known about Asian health data in Canada has been extrapolated from studies on migrant populations, despite the groups 'Asian' and 'migrant' being culturally and linguistically diverse (CALD), and distinctive population groups. Interchanging between the classification of 'Asian' and 'migrant' to make generalisations about Asian health in the Canadian literature has proven challenging, in order to benchmark other countries where 'Asian' and 'migrant' categories are disaggregated (Khan, 2015).

The New Zealand health and disability sector classifies ethnicity data according to the Ethnicity Data Protocols for the Health and Disability Sector (2004). These Protocols outline a hierarchical system of classification where ethnic groups are aggregated into progressively broader groups ranging from level 1 to level 4 according to geographic origin or cultural similarities. The level 1 category 'Asian' is often routinely collected and reported at the national level for some priority areas including cervical screening and smoking (Mehta, 2012). The level 1 group 'Asian' is then subdivided into five level 2 categories: 'Other Asian', 'Chinese', 'Indian', 'South East Asian', and 'Asian Not further defined' (Asian NFD). At the most detailed level of the classification structure (level 4), larger groups are disaggregated or differentiated in which the majority of Asian ethnicities are grouped based on size, cultural differences and origin.

The challenge faced in New Zealand is central government's lack of priority and direction to lead routine reporting at a minimum to level 1 'Asian' for nationally monitored conditions such as breast screening rates. Moreover, there are disparities across conditions in which 'Asian' as a level 1 category is not routinely reported, yet there is mandatory expectation by the Ministry of Health for Primary Health Organisations (PHO) to collect and report ethnicity for Indian (South Asian) at level 2 for 'Heart and Diabetes Check' target without any comparison to other Asian ethnicities at level 2. This limitation impacts on the DHBs' ability to track health trends by ethnicity and effectively monitor its performance to health outcomes and reduce health inequalities across Asian ethnic subgroups.

There has been progressive work done at the New Zealand MoH level in the past decade with disaggregation of the ethnicity data to include Middle Eastern, Latin American or African (MELAA) group in the New Zealand 2006 Census, and the separation of Indian (South Asians) from the Asian group. Moreover, the inclusion of ethnicity data to level 4 is compulsory in the MoH Minimum Dataset for hospitals established in 2009. A recent significant shift has been the updating of the MoH Ethnicity Data Protocols for the Health and Disability Sector (2004) recommendations. Refreshed protocols support a transition from the previous minimum requirements of collecting up to three ethnicities at Level 2 classification; to collecting up to six ethnicities at Level 4 classification. This reflects the requirement for information systems to capture the greater population diversity and improved granularity of information to plan, fund and monitor health services. These changes represent a significant move forward in terms of ethnicity data collection and will make a valuable contribution for health. The changes will apply to the whole of the health and disability sector from July 2017.

The updating of the Protocols includes consideration of electronic processes of ethnicity data collection (e.g. example portals, kiosks, electronic health records and online data collection such as the New Zealand Census and health surveys). Statistics New Zealand are involved in the Protocol

update to ensure alignment with the Statistics New Zealand Ethnicity Standard, which applies to the whole-of-government. The Information Technology (IT) systems requirements to support the change from providers (including hospitals and primary care IT systems via the National Collections Annual Maintenance Project (NCAMP) process and the National Enrolment Service) are under development at present (as at January, 2016).

Other New Zealand surveys used to support the development of health services, policy and strategy is firstly The New Zealand Health Survey (NZHS). This NZHS provides information about the health and wellbeing of New Zealanders. Survey data is collected continuously but findings are reported annually. A series of reports were commissioned by the Northern Region Alliance (NRA) to examine time trends in the health status of Asian participants interviewed in recent New Zealand Health Surveys which recruit nationally representative samples of the resident population. The Asian Health in Aotearoa in 2011-2013: Trends since 2002-2003 and 2006-2007 report analyses of the health status of the main Asian communities – South Asian, Chinese, and Other Asian, which have been compared with three other main ethnic groups – Māori, Pacific and European & Other – in the combined 2011-12 and 2012-13 surveys. As well, the Asian Health in Aotearoa in 2011-2013 provides comparisons between the 2011-13 survey and two previous surveys: Asian Health in Aotearoa: an analysis of the 2002-2003 New Zealand Health Survey (Scragg & Maitra, 2005) and Asian Health in Aotearoa in 2006 - 2007: trends since 2002-2003 (Scragg, 2016) to identify any trends in the health status of the Asian community over this time. The topics included in the report cover socio-demographic status, lifestyle risk factors, chronic disease and utilisation of health services.

A second New Zealand research initiative is the Immigration Survey Monitoring Programme (ISMP) – Migrant survey which has been running annually since 2009. Although not health focused, it builds up an evidence base about migrants' settlement and labour market outcomes including perceptions of their settlement experience and satisfaction with living in New Zealand, and employers' experience with migrants and community attitudes towards immigration to inform immigration policy. A key question in the survey directly related to a health indicator aims to identify migrants' current health status in comparison to prior to coming to New Zealand. Data from other survey questions i.e. migrants' satisfaction with life in New Zealand or migrants' current housing arrangements and mortgage arrangements can also contribute to a rich understanding of the settlement factors that directly or indirectly affect the health outcomes of recent migrants living in the country. Similar longitudinal studies for Immigrants are conducted in both Australia and Canada (SNZ, Longitudinal Immigration Survey: New Zealand, 2015).

Communicable disease monitoring

Global public health agencies have shifted focus to improving the collection of ethno-cultural data to assist with communicable disease prevention and control (Gushulak, 2010). Historically, there has been an association of labelling communicable disease risk attributed to targeted ethnic groups risk during periods of outbreak e.g. measles and tuberculosis. Many Australian States and Territories collect ethno-cultural data (including ethnicity, country of birth, year of arrival, and language spoken at home) for their communicable disease surveillance. However, there is no current national strategy to support the collection of ethno-cultural data in disease surveillance in Australia (Quinn, 2014); with variation between the Australian States and Territories about what ethno-cultural data is

actually collected. Furthermore, the data collection is limited to communicable disease surveillance and these do not transfer over into non-communicable disease surveillance routines. Consistently New Zealand and USA experience a common trend, whereby the collection of ethno-cultural data and inclusion of the migrant variables used in Australia have been traditionally linked to communicable disease surveillance, and not transferred over to non-communicable disease monitoring.

Use of ethnicity data

In the UK, over the last two decades, a consistent feature of ethnic monitoring in routine healthcare settings has been the limited use made of the data collected. Possible reasons for such limitations include, organisational perceptions of ethnic monitoring being a bureaucratic statistical exercise (Aspinal, 2002), structural inequities and institutional racism (Bhopal, 2007), and the fact that additional resources needed for tackling such inequities may not be prioritised in the context of international healthcare reforms that have emphasised cost reductions (Varcoe, 2009).

On the other hand, ethnicity data in New Zealand has a more coherent translation into healthcare planning and into available reports, particularly with the Māori and Pacific population health trends largely driven by the national MoH health targets. Ethnicity data available for 'Asian' and 'MELAA' guides the development of the Annual Plans – Action Plan section for Asian, New Migrant and Refugee Health at the Waitemata and Auckland DHBs. The focus on ethnic specific health derived needs from ethnicity data trends is variable, often depending on the demographic needs of each DHB which is largely driven by local needs.

Policy and legal frameworks

Highlights

Migrant Integration Policy Index

The MIPEX (Wong, Mortensen, Lim, & Abbott, 2015) is a unique tool which measures policies to integrate migrants in 38 countries. MIPEX is the most reliable and cited index of integration and citizenship policies, widely used by both qualitative and quantitative researchers globally. It examines the following dimensions with a comparison to what an ideal healthcare system would look like for migrants, including:

- All residents having the same healthcare coverage as domestic nationals in law and in practice
- Access to entitlements, in which all residents can access information in various languages, and through various methods, including cultural mediators
- Healthcare providers informed of these entitlements and equipped to meet their needs, through training, interpretation methods, adapted diagnostic methods and including diversity in staff
- Health policies support these changes and are equipped to respond to the needs of an increasingly CALD society.

Data from the MIPEX report (2014) was analysed based on the health policy criteria above. New Zealand was ranked the highest ahead of every country listed in the MIPEX report, as well as when benchmarked against the reference countries in this benchmarking report. The findings demonstrate that migrants in New Zealand receive the most equitable entitlement as compared to our reference countries both in terms of policy and in practice. There are local policies implemented to cater for the migrant population where there is a high migrant population density. These policies make New Zealand one of the most progressive countries as benchmarked against the countries in this report, but also in the Organisation for Economic Co-operation and Development (OECD).

Drivers of change

Globally, there is competition to attract, recruit and retain talent to drive the national business growth agenda. New Zealand is right in the mix of this competitive drive for migrant talent. Canada recognises the advantage of highly skilled migrants and international students filling the labour shortage in highly skilled areas, growing the economy and nation building. New immigration policies and programmes have been specifically created to make it easier for international students to study, work, and become permanent residents in Canada, especially for graduate students (Gopal, 2014). New Zealand's new immigration approaches are similar to Canada's in terms of purpose and intention. The result has seen unprecedented net migration of permanent and temporary migration of individuals from Asian countries such as India (21%), China (19%) and the Philippines (9%) who choose to live, work and study in New Zealand (MBIE, Auckland's Migration Statistics and Trends, 2016). However, current policies shaping migrants lives through rules around time limits, work rights and the possibility of gaining permanent residence creates situations where some temporary migrants experience increased vulnerability including demand for and access to services and unmet need (Collins, 2016) National drivers include:

- New Zealand's immigration policy which has progressively shifted from an emphasis on permanent settlement towards an increasing focus on temporary migration (Collins F. , 2016). Research indicates that 36.1% of temporary migrants to New Zealand live in the Auckland Central Business District (CBD) (Collins, 2016)
- The internationalisation and commodification of education is another component of change impacting migration in New Zealand (Collins, 2016). Growth in the export value of international education is a significant contributor to the country's Business Growth Agenda. Auckland hosts a large proportion of international students - close to 63% - which represents a contribution to the Auckland economy of $1.6 billion (MBIE, Auckland's Migration Statistics and Trends, 2016). A key policy encouraging international students to study in New Zealand, in particular in the Auckland district, is driven by targets set by the Auckland Tourism, Events and Economic Development (ATEED) Agency (92,000 by 2025, currently at 70,000 in 2015) (ATEED, 2016)
- Retention policies to encourage international students holding New Zealand degrees to stay post study and work in high value sectors. New Zealand offers work search visas under two categories – Open and Employer Assisted. The Open visa is for 12 months; the Employer assisted visa is for between 2 to 3 years. Students who stay on after they graduate are more likely to stay permanently (MBIE, Auckland's Migration Statistics and Trends, 2016). ATEED has set a target of 25,000 international education jobs within in the Auckland region by 2025 (currently 15,000 in 2015).

Migrant Integration Policy Index

This section focuses on the regulatory frameworks that act as a driver for Asian and migrant health at a national and regional level, with a particular focus on migrant entitlements to healthcare; and the policies that enable the provision of culturally appropriate, responsive and equitable healthcare services.

The MIPEX (Wong, Mortensen, Lim, & Abbott, 2015) is a unique tool which measures policies to integrate migrants in 38 countries (all European Union (EU) Member States, Australia, Canada, Iceland, Japan, South Korea, New Zealand, Norway, Switzerland, Turkey, and the USA). The development of MIPEX is led by the Barcelona Centre for International Affairs (CIDOB), and the Migration Policy Group (MPG). MIPEX has extensive and long-term collaboration with partners (such as the Australian National University, and the EU) and individual experts, in order to ensure their comparisons and resources are up-to-date. MIPEX is the most reliable and cited index of integration and citizenship policies, widely used by both qualitative and quantitative researchers globally.

Eight policy domains have been developed to create a multi-dimensional picture of migrants' opportunities to participate in society. These domains include policies related to access to education, labour market mobility, and policies specific to the healthcare sector. Within the domain of health, MIPEX examines the following dimensions with a comparison to what an ideal healthcare system would look like for migrants, they include:

- All residents having the same healthcare coverage as domestic nationals in law and in practice
- Access to entitlements, in which all residents can access information in various languages, and through various methods, including cultural mediators
- Healthcare providers informed of these entitlements and equipped to meet their needs, through training, interpretation methods, adapted diagnostic methods and including diversity in staff
- Health policies support these changes and are equipped to respond to the needs of an increasingly CALD society.

Based on health policy criteria above, New Zealand was ranked the highest ahead of every country listed in the MIPEX report as well as when benchmarked against the reference countries in this Report. The reference countries rankings were: USA (3rd), Australia (4th), the UK (7th) and Canada (18th).

Because of the extensive scope of the MIPEX comparison and the relevance of their comparison to this Report, this section draws heavily from the health policy comparison described in the most recent MIPEX (2014) report (Wong, Mortensen, Lim, & Abbott, 2015). Other comparable countries such as Singapore, China and India are not included in the list, however inclusion of the literature on health policies from these countries has been included, where available.

Entitlements

For the context of this Report, entitlement is a relative term that compares the level of entitlement migrants are given as compared to the domestic citizens of that country. It should be noted that

equal entitlement for migrants in one country, may not translate to the same level of services in another country that offers equal entitlement for their migrants, because of inherent differences in funding models in each country. For example, permanent residents in New Zealand can access publicly funded healthcare for relatively low private co-payment fees, where as their counterparts in the US will still need to contribute a relatively high co-payment fee and financial burden in the form of insurance or personal cost, despite both having similar eligible entitlements relative to their domestic citizens. Although the law may grant migrants certain entitlements to healthcare coverage, administrative procedures (e.g. requirements for documentation or discretionary decisions) often prevent them from exercising these entitlements.

Australia and New Zealand grants equitable healthcare entitlement to legal migrants. In both these countries, the level of entitlement is dependent on an individual's approved visa condition e.g. 2 year continuous working visa, permanent residency. In the US, permanent residents must wait an extra five years for equal entitlements, whereas in Canada, legal migrants have to wait three months with exception for children, pregnant women and public health reasons in both countries. Entitlement for the free National Health Services (NHS) in the UK is restricted by the 2014 Immigration Law and is only free for 'ordinary resident' legal migrants, with other migrant categories paying for access to any health services except primary healthcare and emergency care (Smith, 2015). However, there is no minimum period of residence that confers 'ordinary resident' status, and migrants require some subjective measurement of 'identifiable purpose' of residency before approved eligibility.

In Canada, the US and UK, legal restrictions and administrative obstacles undermine the entitlements of migrants in practice. In Canada, the issues relate to documentation and discretion is cited as a key barrier, whereas in the US, there is a five year wait to access equitable entitlement. In the UK, legal difficulties in becoming an 'ordinary resident' are cited as a key challenge experienced by migrants (Wong, Mortensen, Lim, & Abbott, 2015).

Undocumented migrants include, (a) migrants whose applications to be recognised as a 'refugee' or 'protected persons' are unsuccessful and whose appeals against this are unsuccessful, (b) people who have exceeded the terms of their visa ("over-stayers") and, (c) people who have entered the country illegally and not applied for a visa or refugee status. In Australia, health and integration concerns underpin the country's immigration policies. People arriving seeking asylum without visas are placed into mandatory detention with detention centres often based offshore where individuals are only entitled to emergency care. Outside the centres, undocumented migrants have very limited access to health services.

Undocumented migrants in New Zealand and the UK are denied equitable entitlement, and usually can only access emergency care and healthcare related to public health reasons. In New Zealand, the Accident Compensation Act 2001 enables the government to run a "no faults" insurance type scheme known as the Accident Compensation Corporation (ACC) to cover the costs of any accident by an individual while in New Zealand. This scheme applies equally to kiwis and foreign visitors, such as international students (ACC, 2001). Despite undocumented migrants ineligibility for other publicly funded health care, both Waitemata and Auckland DHBs' policies enable individuals who require urgent care to access emergency services regardless of visa status.

In the US, undocumented migrants are excluded from federal coverage and Medicare. In Singapore, migrants are not included in the government-run universal health coverage (Guinto, 2015) However, in Australia, New Zealand, UK and the US, refugees and protected persons including those seeking asylum are also entitled to equal health coverage with the exception of a community based asylum seeker whose appeal claim has been refused.

Drivers for change

For decades, Canada has been considered an international leader in integrating newcomers leading MIPEX scores based on their welcoming immigration policies which have benefited Asian populations from countries such as Hong Kong and the Philippines. The UK has experienced sustained net migration over many years from large immigrant groups from Asian countries such as India and Pakistan, and with asylum and refugee inflows from other parts of the world (notably Syria, Somalia, Afghanistan, China, and Iraq) which has contributed to increasing ethnic diversity (Somerville, 2009). Policies in Singapore to attract and rely on foreign manpower namely from South Asian countries such as India and Sri Lanka at both the high and low ends of the labour spectrum to overcome the limitations of local human capital is a direct consequence of policies in the 2000s (Lin, 2012).

Similarly, over the course of the last two decades New Zealand's immigration policy has progressively shifted from an emphasis on permanent settlement towards an increasing focus on temporary migration (Collins, 2016). Business migration policies play a critical role in attracting people with the commercial nous, experience and global networks to boost the economy. A flow on effect from attracting the right business migrants has been the creation of more jobs for New Zealanders, thereby playing a significant and crucial part in the Government's Business Growth agenda. Migrants come to New Zealand to fill in skill gaps in the labour market, as consumers of educational services, and as tourists who may also be seasonal workers. The result has seen unprecedented net migration of permanent and temporary migration from Asian countries such as India (21%), China (19%) and the Philippines (9%) who choose to live, work and study in New Zealand (MBIE, Auckland's Migration Statistics and Trends, 2016). Migrants tend to be more qualified than the New Zealand born population, and are less likely to hold no qualifications and more likely to hold degree and higher degree qualifications compared to the New Zealand born population (MBIE, Auckland's Migration Statistics and Trends, 2016).

New migrants both permanent and temporary may enter the country under the following programmes:

1. Skilled Migrant Category (SMC) visa holders[4]
2. Skilled temporary visa holders
    - Essential Skills via holders in skilled employment
    - Work to Residence visa holders (Accredited Employer and Long term Shortage List categories)

[4] On 11 October 2016 changes were made to the Government's New Zealand Residence Programme (NZRP) for the next two years, https://www.beehive.govt.nz/release/nzrp-changes-strike-right-balance?utm_source=Engage&utm_medium=Email&utm_campaign=Oct%20policy%20changes%20-%20spa%20connect&utm_content=beehive.govt.nz%20-%20NZRP%20changes%20to%20strike%20the%20right%20balance&utm_term=&uid=

- Former international students on Post Study visas with qualifications at level 7 or above on the New Zealand Qualifications Framework (NZQF)

3. The partners and families of the above groups
4. International/Humanitarian [5].

Auckland continues to be the main destination for migrants to New Zealand, particularly those of non-European decent. Almost 50% of SMC principal applicants reside in Auckland (MBIE, Auckland's Migration Statistics and Trends, 2016). Moreover, research indicates that 36.1% of temporary migrants to New Zealand live in the Auckland Central Business District (CBD) (Collins, 2016).

In 2015, the Ministry of Business, Innovation and Employment (MBIE) launched their Migrant Settlement and Integration Strategy (Appendix 9) which is the Government's approach to effectively settle and integrate migrants in New Zealand, so that they:

"Make New Zealand their home, participate fully and contribute to all aspects of New Zealand life". It was approved by Government in July 2014 and builds on the New Zealand Settlement Strategy launched by Government a decade earlier. Health is reflected in the new Outcomes Framework - Outcome 5: Health and Wellbeing – *Migrants enjoy healthy lives and feel confident and safe*. There are three key success indicators:

1. Increased proportion of recent migrants who feel safe in New Zealand
2. Fewer recent migrants are victims of crime
3. Increase proportion of recent migrants enrolled in a Primary Health Organisation.

Strategy outcome will be measured against 16 success indicators using existing data-sets and surveys. Although, an Implementation Plan to roll out the health component has not been developed as yet, interpretation of this health goal suggests providing accessible, culturally responsive and equitable health, mental health and disability services to peoples from Asian, refugee and CALD migrant backgrounds. There are strategies and measures developed as part of the Auckland Regional Asian & Middle Eastern, Latin American and African (MELAA) Primary Care Working Group to increase Asian PHO enrolment annually in the Auckland DHB and Waitemata DHB, New Zealand (WDHB, Auckland Regional Asian & MELAA Primary Care Action Plan 15-16, 2016).

Policies to support Asians from refugee backgrounds in New Zealand include the New Zealand Refugee Resettlement Strategy's (Appendix 10) vision of *Refugees participating fully and integrated socially and economically as soon as possible so that they are living independently, undertaking the same responsibilities and exercising the same rights as other New Zealanders and have a strong sense of belonging to their own community and to New Zealand*. There are five goals of the Strategy with a Health and Wellbeing Outcome which specifies refugees and their families enjoy healthy, safe and independent lives. There are three success indicators that are measured nationally, (a) Refugees' utilisation of general practitioner services, (b) Children of quota refugees receiving immunisations 6 and 12 months after arrival, and (c) Refugees' access to mental health services.

[5] New Zealand Refugee Quota Programme changes announced, https://www.immigration.govt.nz/about-us/what-we-do/our-strategies-and-projects/supporting-refugees-and-asylum-seekers/refugee-and-protection-unit/new-zealand-refugee-quota-programme

In Australia, each State and Territory publishes an explicit Plan for Action on migrant health, and policies are implemented to support these measures. There is strong support from the federal government in the US to make migrant and minority health a priority for all Departments. Canadian Public Health policies provide basic support to make services more responsive to migrants but the policies are implemented in a less coordinated manner as compared to the above countries. In the UK, Action Plans are implemented with an increasing focus on reducing health inequalities, due to the Equality Act's requirements for equality duties by all public agencies (Wong, Mortensen, Lim, & Abbott, 2015).

Utilising the data gathered through research on migrant health is extensive in Australia, and used to inform migrant health policies as part of their approach to multicultural access and equity, as well as planning of refugee settlement services. Such data and research is also available in Canada, UK and USA to some degree, however the outcomes of the research data are not as readily incorporated into policies when compared to New Zealand and Australia. In New Zealand, data and research disaggregated by ethnicity often to level one and level two (where data is available), is applied to guide in the development of migrant specific health practices (where possible), although strategies and stakeholders are more focussed on Pacific and Māori health and, to some extent, refugees rather than migrants specifically.

International students

The internationalisation and commodification of education is another component of changes to the orientation to migration (Collins, 2016). International education is an important enabler in strengthening New Zealand's economic, cultural and social links with the world. Growth in the export value of international education is a significant contributor to this objective. Some 55% of the 84,856 international students approved to study in New Zealand were in Auckland in 2014-15 (Collins, 2016). Furthermore, there was a 14% increase in the number of international students studying either short term or long term in 2015, where a large proportion were living and studying in the Auckland CBD (NZE, 2016). A key policy encouraging international students to study in New Zealand, in particular in the metropolitan Auckland region is driven by targets set by ATEED (92,000 by 2025, currently at 70,000 in 2015).

Policies encourage retention of international students holding New Zealand degree qualified students to stay post study and work in high value sectors. New Zealand offers work search visa under two categories – Open and Employer Assisted. The Open visa is for 12 months. Employer assisted visa is for between 2 to 3 years. ATEED has set a target of 25,000 international education jobs within in the Auckland region by 2025 (currently 15,000 in 2015). Students who stay on after they graduate are more likely to stay permanently (MBIE, Auckland's Migration Statistics and Trends, 2016). Research by Collins (2016) indicates that temporary migrants experience vulnerability related to the rules around time limits with their visas, work rights, and the possibility of gaining permanent residency. Most people with temporary visas finance their migration through savings, however they have considerable debt whereby 40% of people from India and the Philippines are in debt, and 28% of people intending to apply for permanent residency are in debt (Collins, 2016).

The projected growth of international students studying in Auckland and in the PTEs (mostly based in the Auckland CBD), as well as policies driving post study work has the potential to continue to place demand on health services such as the Auckland City Hospital, and unmet need for vulnerable

migrant population groups. An increasing and rapidly changing demographic trend in the Auckland DHB catchment, in particular student and new migrant populations living in the CBD will require immediate and targeted interventions to increase:

- awareness of the New Zealand health and disability system
- awareness of, and access and utilisation to pathways to primary care and other health and disability services
- health literacy
- health promotion
- language support.

Joint-agency work as part of the Auckland Agency Group (AAG) is providing invaluable insights for the development of a New Zealand International Student Wellbeing Strategy led by the Ministry of Education (MoE). Health & wellbeing is included as one of four outcomes pillars in the framework guided by contributions from the Auckland and Waitemata DHBs.

Table 5 Interventions delivered to students and migrants in the Auckland and Waitemata DHBs

Priority Area	Action
Awareness raising: - NZ health & disability system - Regular family doctor (GP)	• Targeted and tailored media campaigns (online, radio, print in multiple languages) about Your Local Doctor, Healthcare – where should I go? to population segments (students, Asian new migrants) • Enrolment packs to universities, PTEs and Citizen's Advice Bureau (CABs), other ethnic and settlement platforms etc. • Video podcasts (English, Mandarin and Hindi) on the NZ health & disability system • Face-to-face workshops on the NZ health & disability system • Collaboration with partners such as Immigration New Zealand INZ), NZ Qualifications Authority (NZQA) CAB sites, ATEED, universities, PTEs, libraries, NGOs, settlement information agencies, ethnic groups on their outreach and promotional strategies to support new migrants and students related to health system awareness, and access to and utilisation of health services • Websites – NZ Now, Your Local Doctor, Other • Articles in publications such as Immigration New Zealand's Settlement Action NZ and LINKZ

	• Social media e.g. partner Facebook pages • Presentations at migrant, refugee and student forums.
Policy & practices	• Health system information into the regulatory NZQA Guidelines for the Education (Pastoral Care of International Students) Code of Practice 2016 • Health inputs into the New Zealand International Student Wellbeing Strategy Outcome Framework – Outcome 3: Health & Wellbeing.

Asian and migrant sensitive health systems - health service access and utilisation, and health workforce

Globally, societies are becoming increasingly multi-cultural, multi-lingual and multi-ethnic where Asian newcomers' health inequalities and health status can vary greatly to that of the host population. The variation in health status can mean that particular Asian subgroups including those from culturally and linguistically diverse migrant and refugee backgrounds may be more vulnerable and susceptible to disparities in their ability to find, understand and act on health information, engage meaningfully with health professionals, and to access and utilise health services appropriately. Moreover, the healthcare system is challenged in its capacity to deliver affordable, accessible, culturally appropriate and responsive services.

Asian and migrant populations face a number of access barriers including lack of familiarity with the healthcare system in the host country, enrolment processes and entry points, financial and structural barriers to receiving care, language, and exposure to a disparate culturally sensitive workforce (Gushulak, 2010). It is therefore imperative for the health system to accommodate for the differences in health need in order to provide an equitable health service for all. In this section we examine the responsiveness of healthcare services, including accessibility to health information, availability of language interpreter services, health promotion, cultural competency workforce development services, and diversity in the health workforce.

Targeted migrant health policies are usually stronger and services more responsive in countries with greater wealth i.e. Gross Domestic Product (GDP) which are tax-based as opposed to insurance-based health systems (Wong, Mortensen, Lim, & Abbott, 2015). For example, countries with the most culturally sensitive healthcare system are embedded within a universal welfare-based financing model (Australia, New Zealand and UK), the only exception being the US. However, these countries (such as the UK) may not necessarily grant migrants the best entitlements to their culturally adaptive healthcare system (as mentioned in section 2.1).

Highlights

CALD cultural competency training

Waitemata eCALD® services are a world leader in the development of CALD cultural competency training for the health workforce.

A comprehensive and quality range of CALD online and face-to-face courses and resources for the New Zealand health workforce have been developed by Waitemata DHB's eCALD® Services (WDHB, eCALD, 2016) with the aim of improving:

- the quality of engagement of health practitioners and CALD clients/patients
- cross-cultural communication and interactions between employers and employees, as well as employees-to-employees working in a culturally diverse workplace.

New Zealand health bodies have endorsed eCALD® courses and resources for their members, for example, the Royal New Zealand College of General Practitioners and the Health Regulatory Authorities of NZ (HRANZ) which includes: the Dental Council of NZ, Dietitians Board, Medical Council of NZ, Midwifery Council of New Zealand, Medical Radiation Technical Board, Medical Sciences Council, NZ Chiropractor Board, NZ Psychologists Board, Nursing Council of NZ, Occupational Therapy Board of NZ, Pharmacy council of NZ, Physiotherapy Board of NZ, Podiatrists Board of NZ, Psychotherapists Board of Aotearoa NZ, and the Optometrists and Dispensing Opticians Board.

National primary care and non-governmental organisations such as Pregnancy Help, Plunket NZ, Family Works, and Metlifecare are working with eCALD® to roll out courses to their employees. There is strong interest from the University of Auckland, School of Population Health and inter-sectoral agencies such as MBIE Settlement Unit of Immigration NZ, NZ Police, NZ Human Rights Commission State Sector Services to the New Zealand Police to adopt/adapt the eCALD® courses. There is also international interest from Denmark, Australia and the US to review/adapt/adopt some of the eCALD® courses and resources.

Diverse workforce

Health organisations recognise that recruiting a diverse health workforce is advantageous to ensuring that the diverse cultural, linguistic and religious needs of their patients are met with the delivery of culturally appropriate and responsive services. In the UK, there is increasing pressure to use migrant labour, largely driven by cost and availability (Wong, Mortensen, Lim, & Abbott, 2015). There are policies in the US to encourage racial and ethnic diversity in the health workforce, but they are not migrant specific (Wong, Mortensen, Lim, & Abbott, 2015). In Australia and Canada, there are very limited measures that encourage the participation of migrants into the health workforce (Wong, Mortensen, Lim, & Abbott, 2015).

In New Zealand, diversity is encouraged in the workforce; however, the policies are often prioritised to Māori and Pacific aimed at engagement, and access to and through health care for prioritised populations, and enabling and creating a sustainable health workforce (MoH, 2016). The rapid net migration of new migrants from CALD Asian backgrounds in both Waitemata and Auckland DHBs

warrants targeted workforce development strategies that include growing and sustaining a diverse, culturally competent workforce that is 'culturally intelligence' in the health sector. Particularly for key high use settings such as primary health, secondary care and mental health to best reflect the needs of the communities they serve now and in the future.

Digital health tools

Australia has best practice examples of two applications or online tools available to support those with CALD Australian and refugee backgrounds:

- The Cancer Council Victoria is a multilingual printable appointment card to help CALD Australians to more easily access healthcare appointments (Cancer Council Victoria, 2016)
- New South Wales (NSW) Refugee Health Service's online Appointment Reminder Translation Tool allows the Service to generate translated appointment details into the client's preferred language (NSW Refugee Health Service, 2016).

In New Zealand, Waitemata DHB has developed the 'Listen Please' clinical translation application for patients to communicate with nurses, doctors and allied health personnel, and vice versa. It is aimed at patients who cannot speak at all (e.g. breathing tube in their airway) but can communicate non-verbally, or patients who cannot speak English but can speak Mandarin/Cantonese Chinese, Korean, Samoan, or Tongan.

Language support

Research shows that language barriers have a negative effect on access to care and prevention services, adherence to treatment plans, timely follow-up, and appropriate use of Emergency Department (ED) services (Gushulak, 2010). Language interpretation is free and generally available to health patients in Australia, New Zealand, the UK and in a few states in the US. In Canada, free services are not readily available, with the patient required to pay for service (MIPEX, 2015). In New Zealand, every individual has the legal right to an interpreter when dealing with the law, with health service providers or during elections, in keeping with Article 21 of the Universal Declaration of Human Rights (UN, 2016). Health interpreting services are free for patients who are eligible and entitled to publicly funded health and disability services living in the metropolitan Auckland DHBs with the aim of (a) ensuring health services are accessible, (b) improving communication, and (c) improving and maintaining clinical safety (WDHB, Asian Health Services, 2016). In 2015-16, the top three languages requested by non-English speaking or limited English speaking clients and hearing impaired peoples for access to primary health interpreting for services such as general practice in both Waitemata and Auckland DHBs were (NRA, Metro Auckland Primary Health Interpreting Report, 2016):

Waitemata DHB

1. Mandarin
2. Korean
3. Sign language

Auckland DHB

1. Mandarin
2. Vietnamese
3. Cantonese

In 2015-16, Immigration New Zealand undertook cross-government work to review and address the language barriers experienced in accessing services provided or funded by government agencies in the six resettlement regions in New Zealand. The Interpreter Services Project focused on available language assistance services for those who are not proficient in English, including the provision and use of interpreters by mainstream agencies, service and programmes (MBIE, Interpreter Services Project - Summary of National Themes from Service Provider Consultation, 2016).

Awareness of health systems for new migrants

In Canada, health system information is available nationally, provincially and through community organisations websites however the literature indicates that many migrants do not readily access this information or fully understand what services they are entitled to (Wong, Mortensen, Lim, & Abbott, 2015). Furthermore, there is a limited sharing of information between Immigration Canada and MoH Canada with healthcare staff. Combined with constant changing policy parameters, it is difficult to provide staff and patients with up-to-date health resources. This means that there are vast variations in the understanding of their own entitlements and healthcare services among migrants (Wong, Mortensen, Lim, & Abbott, 2015).

In the UK, health information for migrants with regards to entitlement and available health services are disseminated in a less co-ordinated manner as compared to New Zealand and Australia. Given the NHS reorganisation over the last few years, such information is only up-to-date and readily available through the NHS main website. However, the information seems to be written in a non-health literate manner with the legalistic English proving to be a barrier to the consumer's ability to understand and access health service information. In the US, NGOs (sometimes in conjunction with state government on an ad hoc basis) infrequently produce multi-language media to provide information about entitlements targeted to specific communities, but many migrants report that the healthcare system in the US is difficult to understand and navigate (Wong, Mortensen, Lim, & Abbott, 2015).

In New Zealand, information to new migrants about the health and disability system, eligibility and entitlements, and how to access health services are made available across multiple platforms and mediums including the Immigration New Zealand and MoH websites and online products, universities and PTEs, libraries, settlement partners such Auckland Resettlement Migrant Service (ARMS), CAB, and CAB's Language Link via telephone support in over 20 languages. Metropolitan Auckland partners include ethnic focused NGOs, private ethnic specific services, cultural case workers, cultural support services i.e. Asian Health Services (Waitemata DHB), and the Asian, Migrant and Refugee Health Gain team (Waitemata and Auckland DHBs).

In Australia, similar robust approaches to dissemination of health information for migrants are also adopted. The settlement services in Australia deliver orientation seminars about Australian health services as well as having booklets in 37 languages to some migrant groups (Wong, Mortensen, Lim,

& Abbott, 2015) (DSS, 2016). Furthermore, they have also developed a DVD in numerous languages for many migrant African groups (DSS, 2016).

Primary and community healthcare

Migrants travel with their epidemiological profiles, their level of exposure to infectious agents, their genetic and lifestyle-related risk factors, their culture- based health beliefs, and their susceptibility to certain conditions. These health risks impact on their capacity and capability to seek out appropriate care pathways where optimal health gains are often influenced by their help-seeking and health-seeking behaviours. Studies indicate that migrants do not use health care optimally which can be caused by barriers that are either social, structural or financial. Understanding the role and benefits of accessing primary health services, at the right time is key to overall good health management. Literature outlines a study highlighting the consequences of not accessing timely and appropriate primary care services (Gushulak, 2010).

In Portugal, the health status and social situations of new-born children in two Portuguese communities with large migrant populations were studied where the results showed higher levels of morbidity for both mothers and babies, along with higher use of emergency rooms instead of local primary care services. In Leicester, UK, a one-stop dedicated primary care service for asylum seekers was implemented whereby services such as screening, mental health assessments, reproductive health services, a health visitor programme for child health, health promotion, and language support were provided to address the difficulty of streaming asylum seekers into the mainstream health system.

In New Zealand, efforts to increase Asian PHO enrolment and the benefits of enrolment for new Asian migrants is a key initiative adopted by both the Waitemata and Auckland DHBs. Between quarter 2 and quarter 1 2016, there was a 1% increase in the Asian PHO enrolment rate for Waitemata DHB from 82% to 83% which equates to 2,616 new enrolments. Due to record net migration, the Auckland DHB rated remained at 74% between quarter 2 and quarter 1 2016, with 1,175 new enrolments.

A campaign titled ‘Your Local Doctor’ campaign was developed in 2012 targeting Asian communities in the Waitemata DHB catchment. The intention of the Asian enrolment drive was to encourage Asian families to enrol with their local family doctor as a first point of call for urgent, less serious medical treatment, access cheaper fees for consultations and prescriptions, and to build a relationship with their family doctor and the general practice. A media campaign and collateral was rolled out across ethnic partner platforms in multi-languages including English, Chinese and Korean. A revised Asian campaign ‘Healthcare – where do you go?’ rolled out in June 2016 to new Asian migrants and students living in the Auckland CBD in Chinese, Korean and Hindi, engaging Asian ethnic media, universities, PTEs, libraries, ethnic partners, settlement agencies and NGOs.

In Singapore, the Health Promotion Board (a Statutory Board under the MoH) has developed and implemented a nation-wide ‘Community Functional Screening Programme’ aimed at addressing the imminent healthcare challenges of Singapore’s ageing population across the three key Asian ethnicities – Chinese, Indian and Malay based on early detection of age-related functional decline. The Singapore’s Ministry of Health Clinical Practice Guidelines on ‘Functional Screening for Older Adults in the Community’ was launched in 2011 for Singaporeans or Permanent Residents aged 60

years and above. Primary care doctors/general practitioners are key partners in the care of their older adult patients and management of their risk of functional decline in the domains of physical function, vision, hearing, oral health, continence, mood and cognition. Three resources were developed to build their capacity in this area, (a) 'Community Functional Screening Programme Follow-up Resource for Primary Care Doctors, and (b) E-module on Management of Functional Decline in Older Adults. Large scale one-stop community functional screening events were rolled out across the country targeting identified ethnic Asian communities and delivered in their preferred languages and/or dialects, where abnormal results across the six functional domains were then referred to their respective local family doctor and/or health professionals for follow-up.

Culturally responsive services

Language support

Equitable policies specific to migrant health entitlements as outlined in section 2.1 is an example of fundamental building blocks that contribute towards attaining an equitable health system for all. Another key factor is the accessibility of information and support for migrants concerning the healthcare system of their host country. This includes information about their entitlements, the role of key segments of the health sector i.e. primary care, the array of health services available including eligibility and access points, and lastly having this information readily disseminated to the new migrants through appropriate mediums/platforms in their preferred language.

Provision of interpretation services, availability and access to language-appropriate written materials and knowing where to source health service information in a preferred language are often the key enablers to improving a new migrant's awareness and access to the healthcare system. Research shows that language barriers have a negative effect on access to care and prevention services, adherence to treatment plans, timely follow-up, and appropriate use of emergency department services (Gushulak, 2010).

Misunderstandings of symptoms or mistranslations have resulted in delayed care, clinically significant medical errors, and death. Language interpretation is free and generally available to health patients in Australia, New Zealand, UK and in a few states in the US. In Canada, free services are not readily available, with the patient required to pay for service (Wong, Mortensen, Lim, & Abbott, 2015). In New Zealand, every individual has the legal right to an interpreter when dealing with the law, with health service providers or during elections, in keeping with Article 21 of the Universal Declaration of Human Rights (UN, 2016). Health interpreting services are free for patients who are eligible and entitled to publicly funded health and disability services living in the metropolitan Auckland DHBs with the aim of (a) ensuring health services are accessible, (b) improving communication, and (c) improving and maintaining clinical safety (WDHB, Asian Health Services, 2016). In 2015-16, the top three languages requested by non-English speaking or limited English speaking clients and hearing impaired peoples for access to the Primary Health Interpreter Services (PHIS), and top three requesting primary health services in both Waitemata and Auckland DHBs were (NRA, Metro Auckland Primary Health Interpreting Report, 2016):

Waitemata DHB

1. Mandarin
2. Korean

3. Sign language

Auckland DHB

1. Mandarin
2. Vietnamese
3. Cantonese

Top three requesting primary health services of PHIS

1. General practice services
2. Hospice
3. Plunket

In 2015-16, Immigration New Zealand undertook cross-government work to review and address the language barriers experienced in accessing services provided or funded by government agencies in the six resettlement regions in New Zealand. The Interpreter Services Project focused on available language assistance services for those who are not proficient in English, including the provision and use of interpreters by mainstream agencies, service and programmes. The settlement regions were: Auckland, Hamilton, Palmerton North, Wellington, Nelson, and Christchurch (MBIE, Interpreter Services Project - Summary of National Themes from Service Provider Consultation, 2016).

Culturally competent workforce

Cultural competence standards in comparison countries are variable In Canada and the US, such standards are required but not monitored with provincial variations occurring across the country. In Australia, various standards on cultural competence, health literacy and community engagement are offered to staff, but this is variable depending on the organisation.

The increasing diversity of New Zealand's population makes it imperative that the development of CALD cultural competencies in the health sector include the recognition of culture as a determinant of health status; and the recognition of the need for a culturally competent workforce to address issues of equity and health disparities between some Asian, Middle Eastern, African and other population health groups in New Zealand. DHBs have a responsibility to ensure equity of health outcomes and access to care.

A comprehensive and quality range of CALD online and face-to-face courses and resources for the New Zealand health workforce have been developed by Waitemata DHB's eCALD® Services (WDHB, eCALD, 2016) with the aim of improving:

- the quality of engagement of health practitioners and CALD clients/patients
- cross-cultural communication and interactions between employers and employees, as well as employees-to-employees working in a culturally diverse workplace.

eCALD® is an international leader in the production and provision of CALD cultural competency courses and resources. The design uses the latest technology for content management, the learning management system (LMS), e-learning, online resources, forum and e-news publications.

The following are the suite of CALD Cultural Competency "Courses for Working with Patients' which address the cross-cultural interactions between health practitioners and CALD patients/ clients and their families. CALD courses are available on-line and face-to-face. They are Continuing Medical Education (CME)/Continuing Nursing Education (CNE)/and Maintenance of Professional Standards (MOPS) accredited (WDHB, eCALD, 2016).

The courses are:

CALD 1 - Culture and Cultural Competence
CALD 2 - Working with Migrant Patients
CALD 3 - Working with Refugee Patients
CALD 4 - Working with Interpreters
CALD 5 - Working with Asian Mental Health Clients
CALD 7 - Working with Religious Diversity
CALD 8 - Working with CALD Families – Disability Awareness
CALD 9- Working in a Mental Health Context with CALD Clients.

Staff working in the NZ health and disability sector are eligible for free Auckland-based face-to-face and online CALD Cultural Competency "Courses for Working with Patients" if they work for:

- District Health Boards across New Zealand
- Primary health organisations across New Zealand
- Community health and disability non-governmental organisations funded by District Health Boards or the Ministry of Health
- Ministry of Health
- Northern Regional Alliance Ltd.

The CALD Cultural Competency "Courses for Culturally Diverse Workplaces" provides a suite of courses that addresses the cross-cultural interactions between employers and employees, as well as employees-to-employees in the workplace. These courses are offered as Auckland-based face-to-face courses and will be funded by the MoH from 1st July 2016. All the courses are published on the eCALD® website - www.eCALD.com.

CALD course uptake is increasing (over 19,000 enrolments) with excellent evaluation results. The evaluation results demonstrate that health practitioners have improved their cultural competence in practice. The eCALD.com website is enhancing international presence with over 127 countries visiting the site.

New Zealand health bodies have endorsed eCALD® courses and resources for their members, for example, the Royal New Zealand College of General Practitioners and the Health Regulatory Authorities of NZ which includes: the Dental Council of NZ, Dietitians Board, Medical Council of NZ, Midwifery Council of New Zealand, Medical Radiation Technical Board, Medical Sciences Council, NZ Chiropractor Board, NZ Psychologists Board, Nursing Council of NZ, Occupational Therapy Board of NZ, Pharmacy council of NZ, Physiotherapy Board of NZ, Podiatrists Board of NZ, Psychotherapists Board of Aotearoa NZ, and the Optometrists & Dispensing Opticians Board.

National primary care and non-governmental organisations such as Pregnancy Help, Plunket NZ, Family Works, and Metlifecare are working with eCALD® to roll out courses to their employees.

There is strong interest from the University of Auckland, School of Population Health and inter-sectoral agencies such as MBIE Settlement Unit of Immigration NZ, NZ Police, and NZ Human Rights Commission State Sector Services to the New Zealand Police to adopt/adapt the eCALD® courses. There is also international interest from Copenhagen, Australia and the US to review/adapt/adopt some of the eCALD® courses and resources.

Standards for CALD cultural competence

The Health Practitioners Competency Assurance Act (HPCA Act) includes a requirement for registration bodies to develop standards of cultural competence and to ensure that practitioners meet those standards. In establishing the Foundation Standard for General Practice in 2015, the Royal New Zealand College of General Practitioners (RNZGP) sought to ensure that all general practices throughout New Zealand demonstrate their commitment to ensuring the safety of their patients and general practice team. Indicator 6 of the Foundation Standard, the practice provides services that are responsive to the cultural needs of diverse patient groups, included the criteria that (6.1) the general practice team are trained in cultural competence and cultural safety; and (6.3) the general practice team can access interpreters and resources for people with limited English proficiency. The resources identified in the Standard include CALD resources (www.eCALD.com). The Standard stipulated the type of evidence to be provided for general practice team to achieve accreditation (WDHB, eCALD, 2016). The Foundation Standard as well as the Cornerstone Standard are now requiring all general practice teams across New Zealand to complete the CALD 1 module by the end of June 2016 for accreditation purposes. With the national rollout of free online and Auckland-based face to face "courses for working with CALD patients" to PHOs, the requirements of the Standards are feasible.

The CALD course uptake by DHB region, by Service Group (March 2009 – May 2016) (Appendix 11) indicates a higher uptake rate by the Waitemata DHB's workforce as compared to Auckland DHB. In particular, greater uptake of courses is required for the secondary care and mental health workforce in Auckland DHB given the growing and diverse ethnic Asian populations domiciled in the district. Furthermore, there is a strong impetus for cultural competency training in both Waitemata and Auckland DHBs as compared to other countries given the projections that Waitemata DHB would have the fastest Asian population growth in 20 years' time from 2013 to 2033, reaching 214,490 (growth rate: 113%), with the national Asian population becoming slightly more than one million (national average growth rate 95%), according to the medium projection series produced by Stats New Zealand. By 2033, the Asian population will likely make up 28% to 39% of the total population for Waitemata and Auckland DHBs. Increased awareness and promotion of the courses as part of building workforce 'cultural intelligence' is imperative to grow a culturally competent workforce and organisation that meets the rapid and changing demographic population in the districts based on record level net migration. The advantages include:

- Improved access and equity for all groups in the population
- Improved health literacy and reduced delays in seeking healthcare and treatment
- Improved communication and understanding of meanings between service users and service providers, resulting in: better compliance with recommended treatment; clearer expectations; reduced medication errors and adverse events; improved attendance at 'follow-up' appointments; reduced preventable hospitalisation rates; improved patient

experience; improved safety and quality assurance; improved 'public image' of health and disability services; better use of resources; and better health outcomes for service users and for culturally diverse populations (WDHB, eCALD, 2016).

Currently there are no identifiable implementation plans established in reference countries to ensure their cultural competence standards be made mandatory by national bodies concerned with standards and education for their entire health workforce. Nor, at the organisational level, are there policies to enforce the uptake of these standards by the health workforce or health organisations.

Cultural support staff

An effective model of care that directly addresses the cultural and linguistic barriers experienced by migrants and refugees from Asian backgrounds is the use of cultural support staff, working both inside health organisations and in the community. Ideally, these cultural support staff are drawn from migrant communities themselves and can play a wide range of roles, such as interpreter, patient advocate, health educator and facilitate social integration (Gushulak, 2010). Such roles exist in Australia and in the UK, but the roles are less well described and varied between regions. In the US, due to the difficulty experienced by migrants and people with limited English proficiency in terms of understanding and navigating through the healthcare system, many state and federally funded community clinics offer mediator or navigator services. These navigator programmes receive government funding to help people understand insurance options and are often targeted at eligible migrants or people with limited English proficiency (NWHLA, 2012).

In Germany, teams of intercultural mediators planned and conducted health events and community learning sessions, including an introduction to the German healthcare system. Such services are found in 22 German municipalities and are funded by national umbrella of health insurers (Gushulak B. , 2010). In 62 hospitals around Brussels, Belgium, cultural support staffs not only provide patient support but they provide the interpretation services as well (Gushulak, 2010) (Verrept, 2008). Some notable examples in New Zealand include community health workers available in the Auckland Regional Public Health Service (ARPHS) with a Burmese specific health worker available for families from Burmese refugee backgrounds.

In New Zealand, notable examples include Red Cross employing case workers and cross-cultural workers in each of the resettlement locations to work with refugees during their first six to twelve months in New Zealand within their own cultural content and language. In Christchurch, Christchurch Resettlement Services has a Bilingual Community Work team of seven people from the five largest refugee communities providing cultural, linguistic and community-based support to clients and to staff across all areas of service delivery to enhance access to services. (MBIE, Interpreter Services Project - Summary of National Themes from Service Provider Consultation, 2016). Both Waitemata and Auckland DHB's deliver Child Development Services that are family centred and offer a comprehensive model of care for clients from CALD backgrounds which are culturally and linguistically appropriate, consultative, collaborative, coordinated and accessible. Dedicated CALD Cultural Case workers are employed to assist and support the respective services to deliver the service components such as assessment, referrals, advocacy on behalf of families, and cultural advice to health team members. In the Planning, Funding and Outcomes team, there is a dedicated Asian, Migrant and Refugee Health Gain team (1.5 FTE) committed to increasing health

gain in targeted Asian, new migrant and/or refugee populations where health inequalities impact on their health status.

In the Auckland DHB's Early Childhood Health team, there is a team of Community Health Workers that specifically work with refugee families across the metropolitan Auckland region in a community development and health promotion role, to support access to health and disability services for families with complex needs. There is dedicated Community Health Worker employed to support families from Burmese (and tribes) refugee backgrounds. In the Auckland DHB, the Asian Mental Health Service works alongside the mainstream Auckland DHB Community Mental Health Services to support clinicians to be more responsive to the mental health needs of Asian service users and their families.

In the Waitemata DHB, the Asian Health Service delivers culturally appropriate, accessible, responsive and effective services to their domiciled Chinese and Korean communities in the district. Services include: (a) Asian Patient Support Services i.e. iCare Health Information Line and GP support, Asian breast screening support, health promotion and prevention seminars, cultural advice for health professionals, (b) Asian Mental Health Services, (c) Interpreting. A service significantly lacking in the Auckland DHB's provider service is the availability of 2-way cultural support to Asian, refugee and new migrants from CALD backgrounds, and the workforce directorates.

Diversity in the health workforce

In the UK, there is increasing pressure to use migrant labour, largely driven by cost and availability. Health organisations recognise that recruiting a diverse health workforce is advantageous to ensuring that the diverse cultural, linguistic and religious needs of their patients are met with the delivery of culturally appropriate and responsive services. Such mindsets have sometimes led to more diverse hiring and more specific partnerships with migrant and ethnic minority organisations (Wong, Mortensen, Lim, & Abbott, 2015).

In the US, there are policies to encourage racial and ethnic diversity in the health workforce, but they are not migrant specific (regardless of whether they are domestic or migrant). There are substantial federal and state employment civil rights policies and recruitment programmes that facilitate training of priority professionals, including scholarships, grants to access training facilities and pre-college academic programmes.

In Australia and Canada, there are very limited measures that encourage the participation of migrants into the health workforce. Notwithstanding, prioritised roles for Indigenous Australians and Torres Strait Islanders are prominent, and in localities there is dedicated ethnic specific workforce to meet the targeted needs of the populations domiciled in the area such as the diverse ethnic communities. Commonly many ethnic specific roles pertain to Community Engagement Officer positions (ABS, 2016).

In New Zealand, diversity is encouraged in the workforce and reflected through guiding Workforce Strategy documents. In New Zealand, diversity is encouraged in the workforce; however, the policies are often prioritised to Māori and Pacific aimed at engagement, and access to and through health care for prioritised populations, and enabling and creating a sustainable health workforce (MoH, 2016). The rapid net migration of new migrants from CALD Asian backgrounds in both Waitemata

and Auckland DHBs warrants targeted workforce development strategies that include growing and sustaining a diverse, culturally competent workforce that is 'culturally intelligence' in the health sector, and within key high use settings such as primary health, secondary care and mental health to best reflect the needs of the communities they serve now and in the future.

Both Waitemata and Auckland DHBs have Workforce Strategy documents i.e. People Strategy (Auckland DHB) aimed at specific deliverables such as capability and diversity. Increasingly, dedicated Asian roles have been recruited across the Waitemata and Auckland DHBs, and the NGO sector to meet the demand and growing needs of their domiciled Asian populations rather than pre-determined at a national policy level. The principles of community development ("by community, for community") are commonly followed. Notable examples of dedicated Asian workforces within key organisations and services include - Waitemata PHO's Asian Smokefree Communities, Chinese New Settlers' Services Trust, The Asian Network Inc. (TANI), Asian Health Services (Waitemata DHB), Asian, Migrant and Refugee Health Gain team (Planning, Funding and Outcomes, Waitemata and Auckland DHBs), and Asian Mental Health team (Auckland DHB).

Health promotion

Evidence indicates that enabling individuals to take control of their health through health promotion interventions aimed at disease prevention and early intervention are most effective. Numerous health promotion projects have been implemented globally with the culturally and linguistically appropriate characteristics of the target population in mind. The most successful programmes often target ethnic groups in a particular locality, and aim to increase participation of the priority population in the intervention's design, implementation and evaluation (Gushulak, 2010). One project that exhibits these success factors is the Innvadiab project. This project was commissioned to reduce the development of type 2 diabetes among Pakistani women living in Oslo, Norway with the objective of systematic dietary education and counselling and physical training (Johansen, 2009). There are similar examples in many other countries, although like many interventions focused on migrants, these efforts are often short-term demonstration projects that diminish after the initial funding period if they are not incorporated into regular public health services (Gushulak, 2010).

Similar themes were described in a systematic review of interventions to promote breast and cervical cancer screening uptake among Asian women worldwide (Lu , Moritz, & Lorenzetti, 2012). The review evaluated various intervention strategies that have been employed in existing programmes to increase participation in breast and cervical screening services among Asian women. These strategies include: home visits, media campaign, mailed culturally sensitive print materials, community and work based education, lay health worker outreach, mobile screening services, and cultural awareness training for health professionals. In this review 18 intervention studies were identified as producing positive results (increase service utilisation among Asian women), and most of them used multiple intervention strategies to target individuals in a specific Asian ethnic group. For example, a combination of assistance in scheduling/attending screening, community based group education, and culturally sensitive audio-visual material increased screening rates among Korean-American women in one interventional study (Fang, 2007), whereas media campaigns and mailed culturally sensitive print materials alone may be ineffective in increasing screening uptake (Lu , Moritz, & Lorenzetti, 2012) . The review stressed the importance of support services, such as assistance in scheduling, in order to make community-based or work-based education intervention

programmes effective. Despite many of these studies showing some effectiveness at health promotion and improving service utilisation, the cost effectiveness and long-term sustainability of these programmes are questionable.

Digital technology

Australia has best practice examples of two applications or online tools available to support CALD Australian and refugee backgrounds. The first, developed by the Cancer Council Victoria is a multilingual printable appointment care to help CALD Australians more easily access healthcare appointments. Consumers simply fill in their client/patient's and provider's details, select their preferred language, submit and print. Patients can use the card to locate and remember their next appointment more easily (Cancer Council Victoria, 2016).

The second tool was developed by the New South Wales (NSW) Refugee Health Service's on-line Translated Appointment Reminder Translation Tool which allows the Service to generate translated appointment details into the client's preferred language. Users type in the details, then either print or save the PDF. The form is generated immediately and can be given to the client in real time, or can also be emailed (NSW Refugee Health Service, 2016).

In New Zealand, the Waitemata DHB has developed the "Listen Please" clinical translation application for patients to communicate with nurses, doctors and allied health personnel, and vice versa. It is aimed at patients who can't speak at all (e.g. because they have a breathing tube in their airway) but can communicate in some other way, or patients who can't speak English but can speak Mandarin/ Cantonese Chinese, Korean, Samoan, or Tongan. It includes printed and audio translations in these languages, and pictures/ photos to further help understanding. It is a stand-alone app and does not need internet access to work (WDHB, Apple Itunes, 2015).

In Singapore, the HealthHub portal is a one stop information platform which allows Singaporeans and permanent residents (PRs) to access their public health records online, this includes hospital discharge summaries and chronic disease laboratory test results from the past six months, as well as their children's dental and immunisation records. Users can also A-Z health information, lifestyle related podcasts and articles, and a directory of healthcare facilities (Ministry of Health, 2016). In New Zealand, the Healthpoint website is a health service information directory with a simple goal of helping people to better understand and use health services (Healthpoint, 2016). Whilst Health Navigator NZ is a comprehensive health information and self-care website for all New Zealanders and their health professionals (District Health Boards, 2016). The Your Local Doctor website available to view in English, Simplified Chinese and Korean, aims to encourage enrolment with a family doctor (GP) and promote the commensurate benefits of seeing one regular family doctor (GP), where to find a health professional, multilingual video podcasts on the New Zealand health and disability system, and other relevant health service information (WDHB & ADHB, Your Local Doctor, 2016). Waitemata DHB's eCALD® services uses the latest technology in the development and provision of CALD courses and resources to support the health workforce to develop CALD cultural competence for working with clients, families and colleagues (WDHB, eCALD, 2016).

Networks and partnerships on Asian and migrant health

The WHO health of migrants – the way forward report (2010) indicates that the migration process itself can be a determinant of ill health for migrants and migrant-hosting communities. Often new migrants feel vulnerable and marginalised as they settle in a new country, where often the services and support they require to settle in and transition smoothly, safely and well within a supportive environment is fragmented. The impetus for building strong mutually reciprocal relationships, partnerships and networks with key vested partners and stakeholders is paramount, particularly for planning and delivering services to vulnerable CALD communities and those ethnic groups who experience poor health outcomes as a result of disability.

The literature historically indicates that the intent for international collaboration and partnership was built on the premise of preventing potential cross-border spread of communicable disease, and still is core focus for most countries. The emergence of communicable diseases as a global health concerns such as the HIV/AIDS epidemic, SARS, the re-emerging of tuberculosis, avian influenza, H1N1, 2014 Ebola outbreak in East Africa, Middle East Respiratory Syndrome and more recently Zika virus has warranted/will warrant greater bilateral cooperation. In 2015, the recent Syrian migrant and refugee crisis in Europe highlighted the need for the EU and other countries globally to work collaboratively, and to a wider extent global effort to manage the humanitarian crisis and displacement of families from their homes.

This section will outline international examples of networks and partnerships forged historically with the aim of strengthening Asian and migrant health globally, bi-regionally and regionally. Addressing migrant health through multi-country regional and global frameworks is challenging. Firstly, partnerships are established based on issues which are political, economic, social, health or migration management, where often health as an agenda, is not the core focus for such collaborations and coordination. Secondly, the need to ensure country sovereignty is often at the forefront of decisions to commit and collaborate, or not, which can impact downstream on those populations who require joint international efforts the most.

There are notable examples of international efforts to integrate health into non-health programmes, networks and meetings which have proven an effective approach to raise awareness on Asian and migrant health.

Highlights

The literature historically indicates that the intent for international collaboration and partnerships was built on the premise of preventing potential cross-border spread of communicable disease, and still is the primary focus for most countries.

A notable partnership between Auckland, Waitemata and Counties Manukau DHBs has been working in partnership with New Zealand Red Cross volunteers and the Mangere Refugee Resettlement Centre. Both have played pivotal roles in promoting the Refugee Primary Care Wrap Around Service (funded by the three DHBs) to their settling quota refugee (including Burmese, Kachin, Chin, Karen and Kayar) and asylum seeker communities aimed at strengthening pathways to enrolment with a family doctor (GP) for access to universal healthcare.

Networks and partnerships

International Network of Health Promoting Hospitals and Health Services (HPH) (WHO, 2016) , commonly referred to as the International HPH Network was initiated by the WHO Regional Office for Europe as a settings approach for healthcare organisations within Europe to improve the quality of health care, the relationship between hospitals / health services, the community and the environment and the satisfaction of patients, relatives and staff. The purpose of the International HPH network is to promote and assist the spread of the concept of health promotion in hospitals and health services, and support implementation within countries, regions, and internationally, through technical support to members and the initiation of new National/Regional Networks. The Network follows internationally acknowledged principles, recommendations and standards or indicators for the health orienting of hospitals and health services. Membership, initially strongest in Europe now includes a number of hospitals from other continents (e.g. Africa and Australia) and networks from outside Europe, Canada-Montréal, Canada-Toronto, China, Taiwan, and Singapore. Singapore's Health Promotion Board membership in the Network, has equipped them with the skills to develop a Health Promoting Health Services (HPHS) - Integrating Health Promotion & Preventive Health into Clinical Care model to address both the rapidly ageing population and chronic burden of disease.

A collaboration between the Americas culminated in the planning and roll out of an annual Binational Health Week (BHW) (Binational Health Week, 2016) which is one of the largest mobilization efforts of federal and state government agencies, community-based organizations, and volunteers in the Americas to improve the health and well-being of the underserved Latino population living in the US and Canada. The initiative in October each year, delivers a week-long series of health promotion and health education activities that include workshops, insurance referrals, and medical screenings. Participants are invited to discuss migrants' health challenges and explore collaborative strategies to enhance the health and conditions of this population. Topics discussed include global health and migration, chronic and emergent diseases of mobile populations, occupational health and safety, access to health services, workforce development, and the health of vulnerable people, including those with disabilities.

Within Asia, the Joint United Nations Initiative on Migration, Health and HIV in Asia (JUNIMA) brings together governments (including The Association of Southeast Asian Nations (ASEAN) Secretariat), leading Civil Society Organisation (CSO) networks, and the United Nations family, to promote universal access to HIV prevention, treatment, care and support for mobile and migrant populations in Asia (JUNIMA, 2016). Singapore is a member of this Network and based on regional collaboration and understanding of migration trends (including migrant workers and mobile populations into the country), is at the forefront in the south-east region for best practice initiatives. Guided by The Health Promotion Board, Singapore, a plethora of prevention and education outreach activities are delivered in the targeted migrant communities to promote HIV/AIDS awareness among migrant workers. These include distributing information materials in various languages to foreign workers, campaigns, holding group discussions and Q&A sessions (HPB, Health Promoting Health Services, 2016).

The International Federation of the Red Cross and Red Crescent Societies (IFRC) is the world's largest humanitarian organization and the unique network of National Societies, covering almost every

country in the world, is the Federation's principal strength. In 2009 migration was included as a policy area for dedicated interventions and effort in the organisation's direction which directly and indirectly impact on health. In New Zealand, there is a strong partnership with the New Zealand Red Cross in the planning and service provision of primary care services to refugees and asylum seekers aimed at strengthening pathways to enrolment with a family doctor (GP) for universal care as part of the Refugee Primary Care Wrap-around Service Agreements across the metropolitan Auckland region. Clear information of 'go to' participating general practices is provided to volunteers and the client services team enabling greater volunteer confidence to advocate for clients entitlements and pathways to primary care enrolment with a local family doctor, and benefits of enrolling. Mangere Refugee Resettlement Centre has also played a pivotal role in promoting this service and connecting refugees (including Burmese, Kachin, Chin, Karen and Kayar) to general practice.

In Singapore, there were two notable examples of multidisciplinary partnerships at the upstream level to build healthcare professionals' capacity to deliver culturally appropriate and responsive care to Indian, Malay and Chinese ethnicities in primary and community care. The first example was the Health Choices initiative, which is a point-of-care tool designed to equip healthcare professionals with the knowledge and skills to deliver brief and intensive advice on four risk factors (based on the demographic and health needs of the Singaporean population of which there are similarities of need for Asian subgroups in New Zealand) – smoking, overweight/obesity, stress and unsafe sexual practices. Two softskills -health literacy and motivational interviewing were built into the design of the resource (HPB, Health Choices - Lifestyle Advice Resource for Healthcare Professionals, 2016).

The Health Choices Steering Committee was a national partnership led by the Board and comprising of healthcare professionals across various Asian ethnicities and from multidisciplinary fields including general practice, dentistry, nursing, pharmacy, optometry, physiotherapy, occupational therapy, dietetics, psychology, sports medicine and public health. The national launch of the Health Choices toolkit in 2012 involved partnering with key international leaders in their fields of Health Literacy and Motivational Interviewing. Furthermore, a follow-on strategy from Health Choices involved partnering with the National University of Singapore to develop a national network of healthcare professional champions interested in a train-the-trainer model and leading Motivational Interviewing practices within their respective multidisciplinary fields.

The second national Singaporean partnership was aimed at healthy ageing - the Management of Functional Decline for Primary Care Doctors Workgroup comprised of specialists from the fields of geriatric medicine, public health, family medicine, ophthalmology, psychiatry, otolaryngology and dentistry. Based on their best expert opinion, the clinicians partnered to develop and launch the 'Community Functional Screening Programme Follow-up Resource for Primary Care Doctors'. The resource was aimed at providing primary care doctors with practical information and management advice that maybe useful in their provision of care for older adults aged 60 years and above after they are referred by the Community Functional Screening programmes for abnormal results across the six domains - physical function, vision, hearing, oral health, continence, mood and cognition (HPB, Community Functional Screening Programme, 2016).

For both initiatives aforementioned, a series of partnerships was formed and endorsed by the Chief Executive, Health Promotion Board, Singapore with the College of Family Physicians Singapore, Singapore Optometric Association, Singapore Dental Association, Singapore Association of

Occupational Therapists, and Pharmaceutical Society of Singapore to run a series of skills courses to healthcare professionals in primary and community health to upskill them on either lifestyle management advice for smoking, overweight/obesity, stress and unsafe sexual practices, and/or management of functional decline in older adults.

In New Zealand, there are a number of key stakeholder networks established at the national, regional or sub-regional levels, led by Central Government Ministries, DHBs or other agencies across health, settlement support agencies, Non-Government Organisations (NGO) providers, academia, immigration networks and community. The priority population foci includes Asians, migrants, and/or refugee populations where health is either the core focus or included in discussions as part of the Terms of Reference. The key networks (though not exhaustive) include: New Zealand Refugee Resettlement Strategy Implementation Auckland/Wellington Key Stakeholders Reference Group, Auckland Health National Refugee Resettlement Strategy (NRRS) Working Group, Auckland Regional Asian & MELAA Primary Care Working Group, Asian & MELAA Health Governance Group (Waitemata and Auckland DHBs), Asian Mental Health & Addiction Governance Group (Waitemata DHB), Asian Mental Health & Addiction Governance Group (Counties Manukau DHB), Asian Clinical Governance Group Committee - Mental Health (Counties Manukau DHB), Pan-Asian Health Interest Group (Counties Manukau DHB), Multi-Ethnic Health Network (Waitemata and Auckland DHBs), The Asian Network Inc.(TANI) General Network Meeting, regional and/or local settlement networks, and ethnic specific groups. There are many other intersectoral ethnic advisory and interest groups established such as the Ethnic Peoples Advisory Panel (Auckland Council) and Asian Advisory Board (New Zealand Police).

In the South Island of New Zealand, there are dedicated groups addressing refugee and migrant health in the Canterbury region, which are: Inter-Agency Network for Refugees and Migrants (INFoRM), Health and Wellbeing Network, Elder Canterbury's Elder Refugee and Migrant Group, and CALD Health Reference Group (CHAG).

Asian population in Waitemata and Auckland DHBs

The number of people in New Zealand identifying as Asian in 2013 was 521,025 (prioritised ethnicity[6]) using the estimated population figures[7] based on Census 2013, with the majority of Asians living in the Auckland region.

There were estimated 127,980 (28% of the total) and 100,550 (18% of the total) Asian residing in the catchment areas of Auckland and Waitemata DHBs respectively (Asians accounted for 12% of the total nationwide).

Table 6 Estimated population by ethnicity (prioritised) and sex, 2013

Ethnic group	Auckland DHB			Waitemata DHB			New Zealand		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Asian	65,840	62,140	127,980	52,470	48,080	100,550	268,405	252,620	521,025
Māori	19,730	18,840	38,570	28,070	27,120	55,190	355,350	336,910	692,260
Pacific	27,420	25,570	52,990	19,770	19,440	39,210	144,760	141,110	285,870
Other	122,190	118,720	240,910	182,860	174,960	357,820	1,501,290	1,441,230	2,942,520
Grand Total	**235,180**	**225,270**	**460,450**	**283,170**	**269,600**	**552,770**	**2,269,805**	**2,171,870**	**4,441,675**

Source: Population Statistics, Statistics New Zealand

Chinese and Indian

The estimated population of Asian sub-groups (Chinese, Indian and Other Asian) were based on their contribution (sex and age specific) to the Asian usually resident population adjusted by the under-count. In both DHBs, Chinese took the first place (40%-41%) in number followed by Indian (23%-33%).

Table 7 Estimated population by Asian sub-group (prioritised), 2013

DHB	Chinese	Indian	Other Asian	Total
Auckland	52,257	42,332	33,391	127,980
Waitemata	39,860	23,206	37,485	100,550
Combined DHBs	**92,117**	**65,538**	**70,875**	**228,530**

[6] Ethnicity is complex and multidimensional concept. The Statistics New Zealand Ethnicity Classification is a four level hierarchical structure. Individual ethnic group information is aggregated into progressively broader ethnic categories from level 4 (the most detailed) to level 3, level 2 and then to level 1 (the broadest). Ethnicity data can be categorised mainly in two ways in New Zealand: Total Response and Prioritised. 'Total response' counts a person in every ethnic group that they have selected; 'prioritised ethnicity' assigns an individual to a single ethnic group in report output. Standard prioritised ethnicity at level 1 is based on the order as follows: Māori, Pacific (Peoples), Asian, MELAA (Middle Eastern, Latin American and African), Other.

[7] The usually resident population number from Census 2013 does not include New Zealand residents overseas at the time of the census or the number of people who did not complete the census. DHBs are funded on the estimated population numbers which are based on the usually resident population plus additional numbers to adjust for census undercount from New Zealand residents being overseas and non-completion of census forms. A post-numeration survey was undertaken after the census to understand the under-count due to non-completion on the census night.

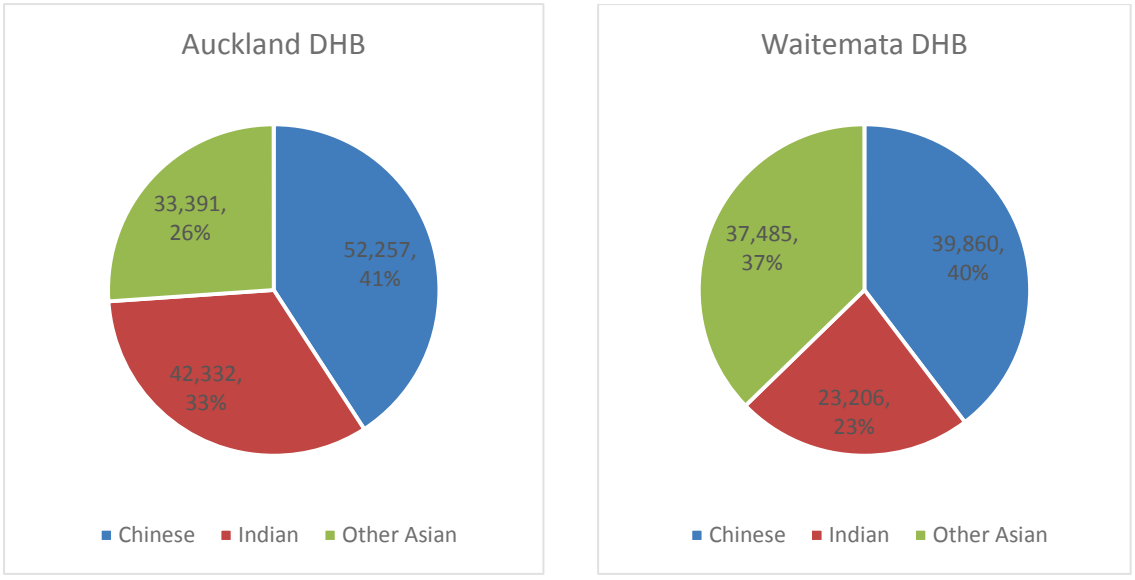


Figure 2 Population proportion (%) by Asian sub-group, Waitemata and Auckland DHBs, 2013

There were more Chinese and Other Asian females than males in both Waitemata and Auckland DHBs, while there were more Indian males than females particularly in Auckland DHB.

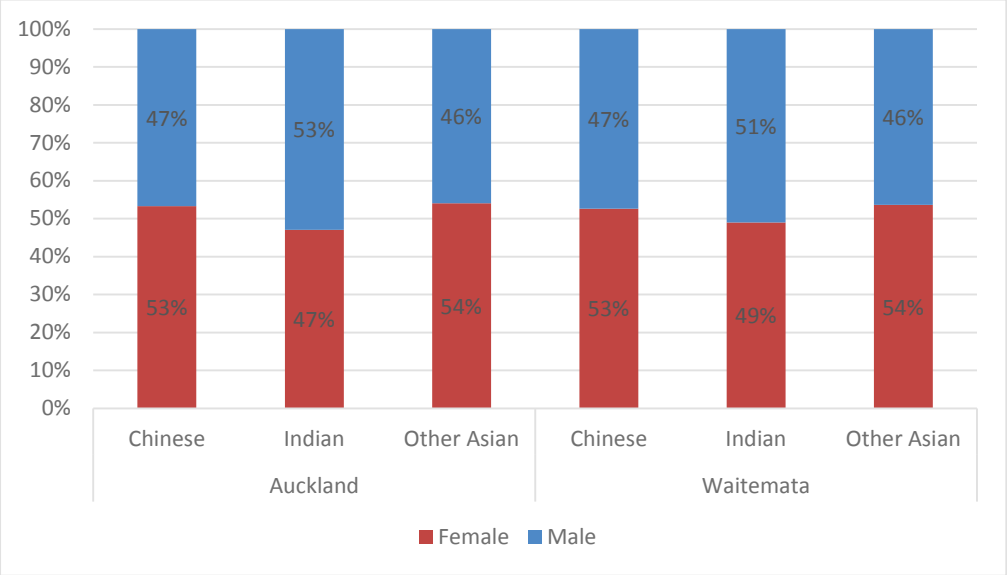


Figure 3 Estimated population structures of Asian sub-groups by sex, 2013

Table 8 Estimated populations of Asian sub-groups by broader age group, 2013

DHB	Ethnicity	Age group			
		0-14 years	15-44 years	45-64 years	65+ years
Auckland	Chinese	7,285	28,600	11,653	4,719
	Indian	7,012	24,282	8,599	2,439
	Other Asian	6,032	20,228	6,188	942
Waitemata	Chinese	6,883	20,524	9,147	3,305
	Indian	4,745	12,371	4,901	1,188
	Other Asian	8,162	18,864	8,961	1,497
Grand Total		**40,120**	**124,870**	**49,450**	**14,090**

Asian had a relatively younger age structure than European/Other in New Zealand. More than 50% of Asian people were aged between 15-44 years in both DHBs, with Chinese having the highest proportion of people more than 65 years of the three Asian sub-groups (8%-9%).

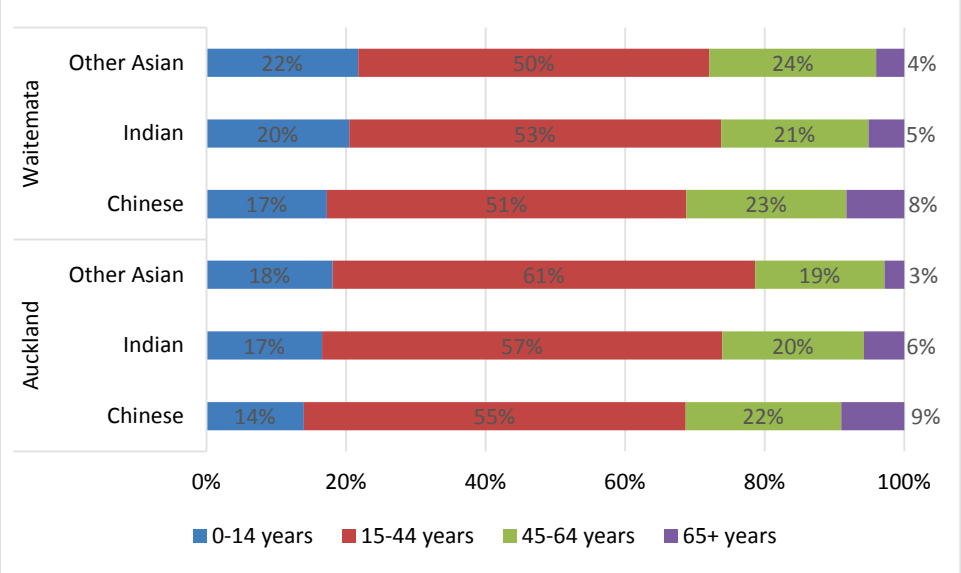


Figure 4 Proportion of broader age groups (%) by Asian sub-group, 2013

Population pyramids illustrate the population structure in terms of age and sex clearly. Figures 4, 5 and 6 show the population pyramids of Chinese, Indian and Other Asian combined for Auckland and Waitemata DHBs. One significant difference in the age structure between Auckland and Waitemata DHBs was that there was a higher proportion of people aged 20-24 years in Auckland than Waitemata DHB. This is thought to because of the high numbers of students studying in the universities in the Auckland DHB catchment area.

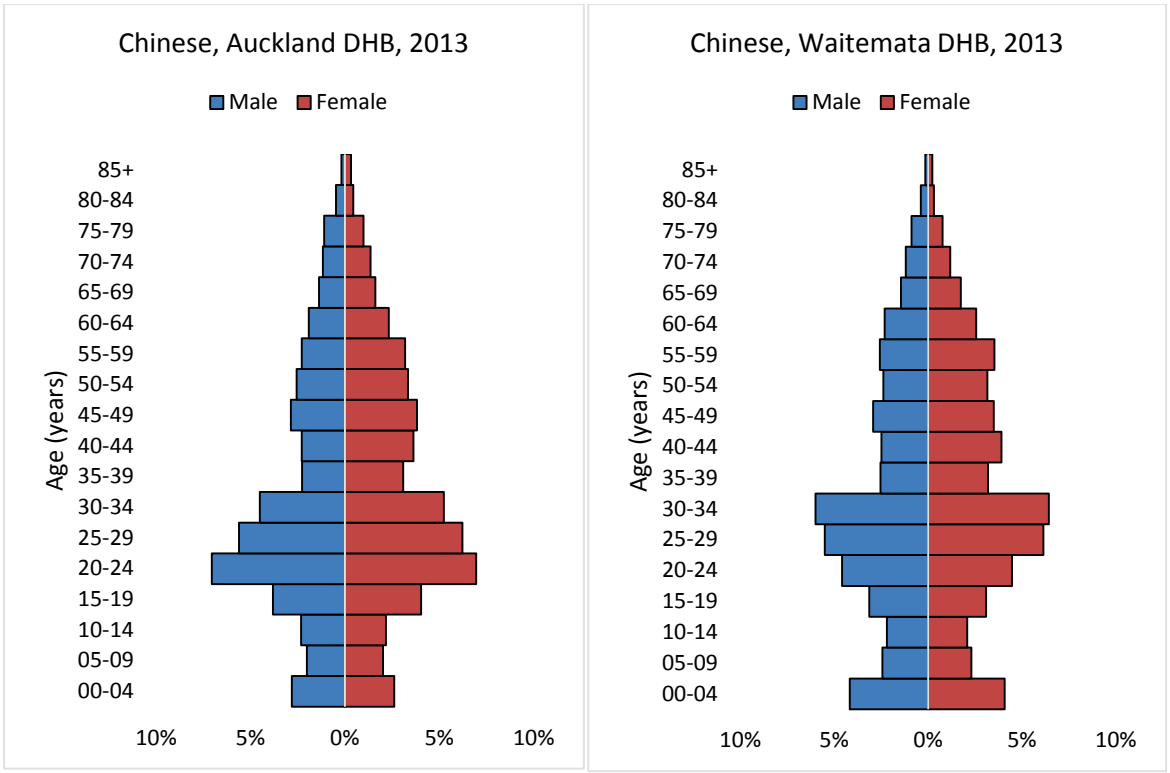


Figure 5 Population pyramids of Chinese, Auckland and Waitemata DHBs

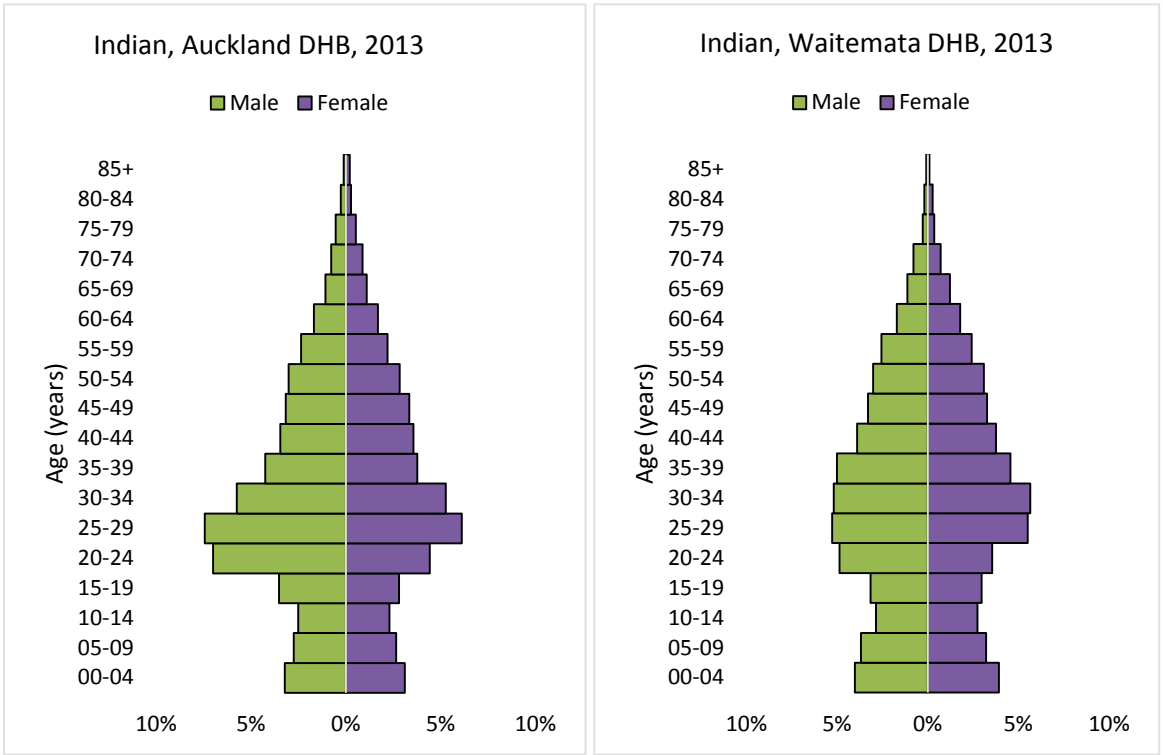
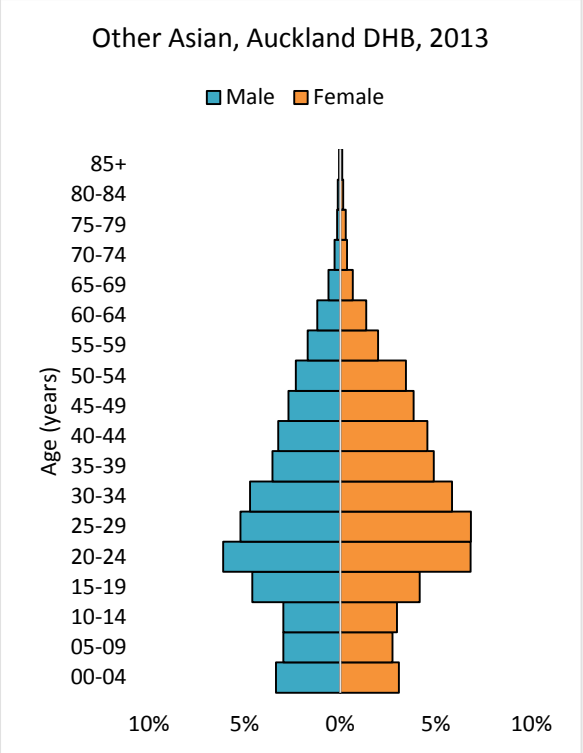


Figure 6 Population pyramids of Indian, Auckland and Waitemata DHBs, 2013



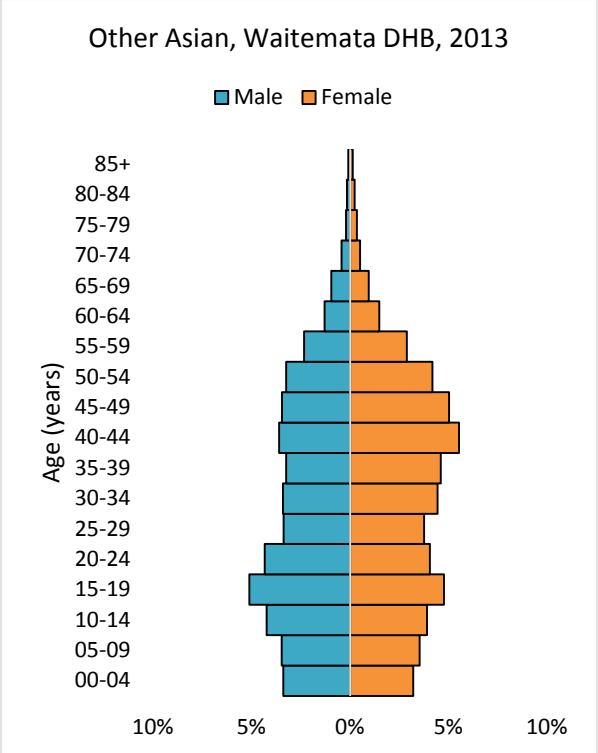


Figure 7 Population pyramids of Other Asian, Auckland and Waitemata DHBs, 2013

Other Asian sub-groups

For smaller sub-groups[8], there was a large Korean population followed by Filipino and Japanese in Waitemata DHB, using Census Usually Resident (CUR) figures (Total Response for ethnicity). In Auckland DHB, Filipino almost matched the Korean population, followed by Sri Lankan and Japanese.

Table 9 Top Asian sub-groups, Waitemata and Auckland DHBs (total response, CUR, 2013)

Ethnicity	DHB		
	Auckland	Waitemata	Total
Chinese	*47,559*	*36,345*	*83,904*
Indian	*38,202*	*21,156*	*59,358*
Korean	6,150	12,480	18,630
Filipino	6,024	9,000	15,024
Japanese	3,231	2,613	5,844
Sri Lankan	4,278	1,296	5,574
Thai	1,608	1,587	3,195
Cambodian	540	1,158	1,698
Other Asian	9,024	6,294	15,318
Total Asian	**115,503**	**90,780**	**206,283**

Source: Census 2013, data under licence, Statistics New Zealand

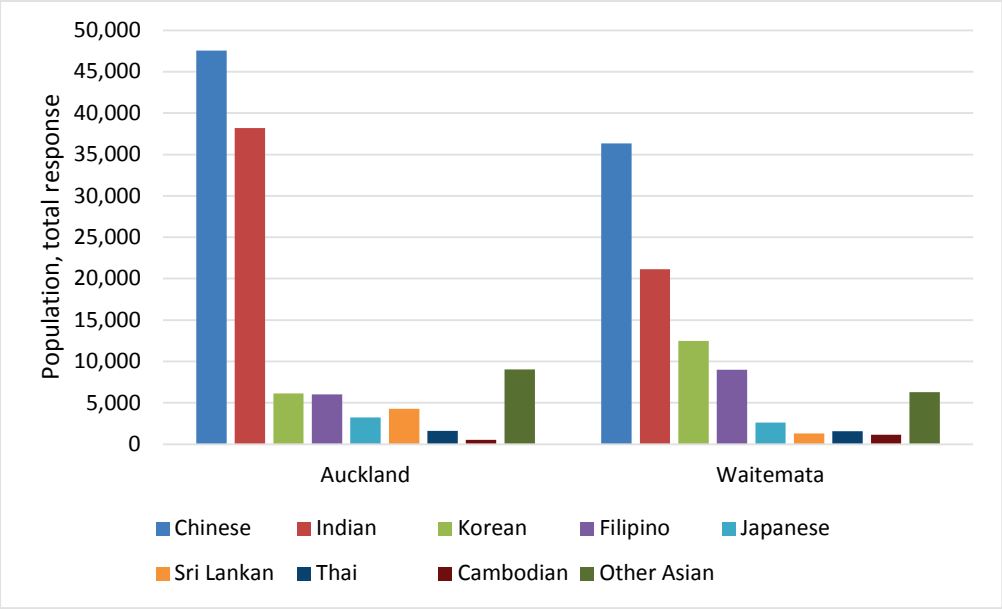


Figure 8 Asian sub-groups, Waitemata and Auckland DHBs, total response, CUR 2013

[8] For relatively smaller Asian sub-groups, only the Census Usually Resident (CUR) figures were available for use and the ethnicity was Total Response. These numbers would be different from the estimated populations in a number of ways: 1) the CUR did not take into account the under-count and people who were temporally overseas at the Census; 2) people could belong to multiple ethnicities (therefore the sum of the 9 ethnic sub-groups is more than 'Total Asian'); 3) the CUR corresponded to the population in March 2013 while the 'estimated population' in 2013 referred to the one as at 30 June 2013. Therefore, we cannot make direct comparison between the numbers of Table 4 and the previous tables.

The top four Asian sub-groups after Chinese and Indian, namely, Korean, Filipino, Sri Lankan and Japanese, all had younger age structures particularly in Auckland DHB. The highest proportion of people more than 65 years was in Sri Lankan communities, which was 8%.

There were also more Korean, Filipino and Japanese females in both DHBs; in particular, there were 26% more Japanese females than males. Further analysis shows that the sex imbalance mainly related to the age group 15-44 years for Japanese (data not shown).

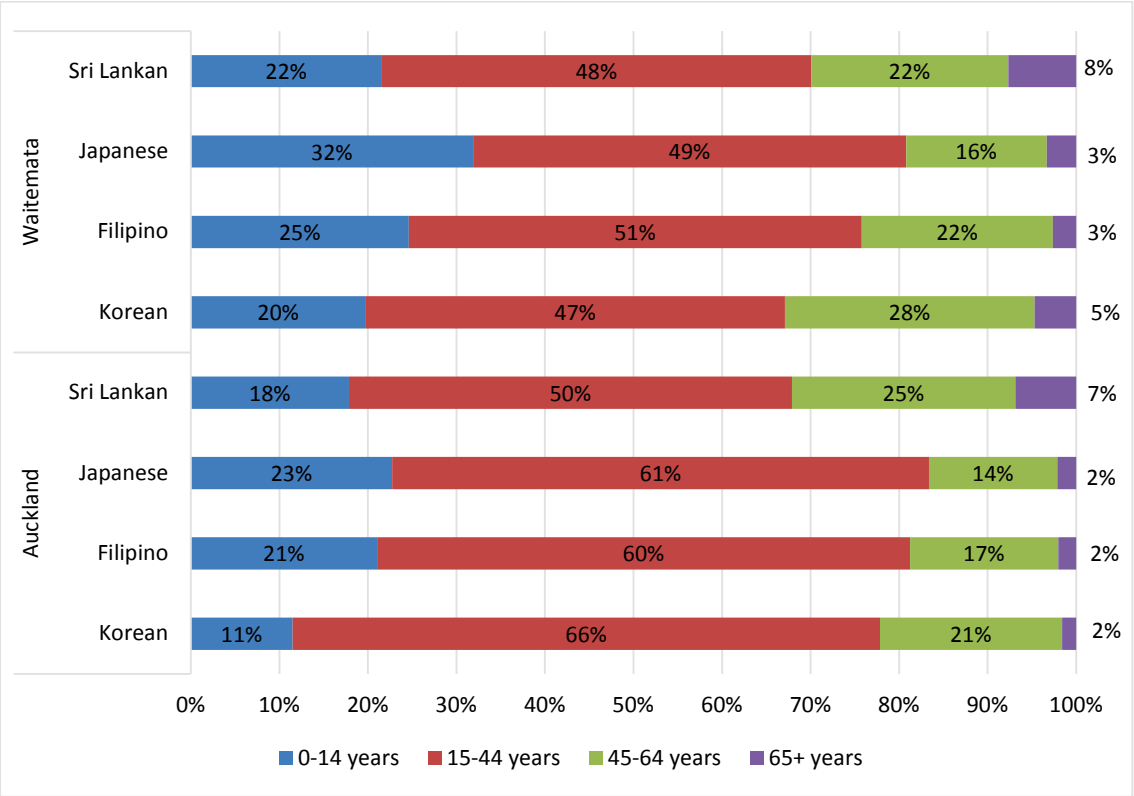


Figure 9 Population structure of Korean, Filipino, Japanese and Sri Lankan by broad age group, Waitemata and Auckland DHBs, total response, CUR 2013

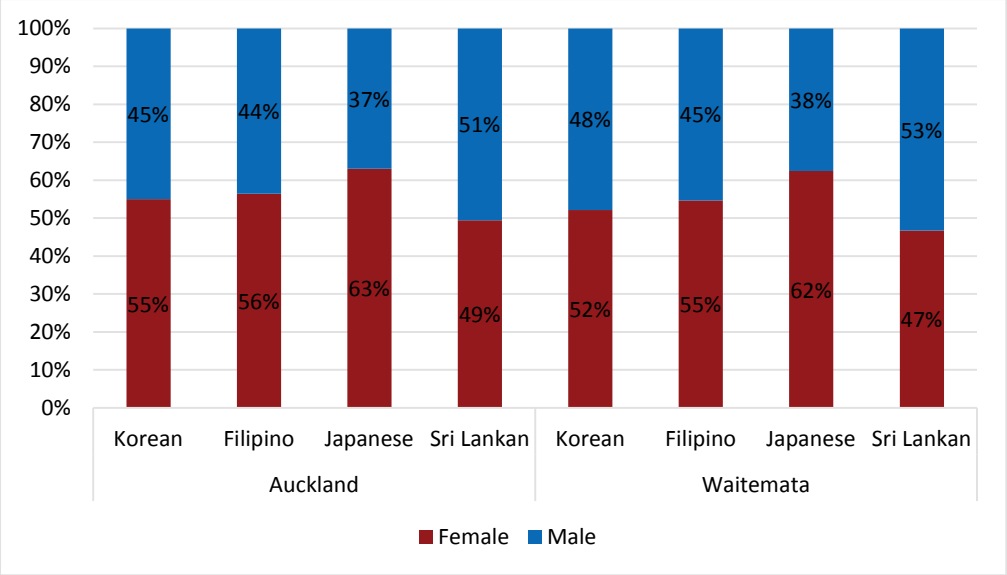


Figure 10 Population structure of Korean, Filipino, Japanese and Sri Lankan, by sex, Waitemata and Auckland DHBs, total response, CUR 2013

Geographical distribution of Asian in Waitemata and Auckland DHBs

Asian people are not distributed evenly across the suburbs for various reasons in both DHBs. **Table 10** listed the top 10 suburbs/area units of Asian residents including Asian sub-groups namely Chinese, Indian and Other Asian. **Figure 11** to **Figure 17** show maps of the geographical distribution of Asian and its sub-groups in both Auckland and Waitemata DHBs. The top five suburbs of Asian residents were Sturges North, Forrest Hill, Target Road, Sunnynook and Pinehill in Waitemata DHB, and were Auckland Central West, Auckland Central East, Hillsborough West, Lynfield North and New Windsor in Auckland DHB.

Table 10 Top 10 suburbs/area units of Asian residents, Waitemata and Auckland DHBs (prioritised ethnicity, CUR, 2013)

DHB	Asian total	Chinese	Indian	Other Asians
Waitemata	Sturges North	Pinehill	Sturges North	Forrest Hill
	Forrest Hill	Sunnynook	Fruitvale	Target Road
	Target Road	Forrest Hill	Kelston Central	Sunnynook
	Sunnynook	Target Road	Glen Eden East	Glenfield Central
	Pinehill	Northcross	Rewarewa	Northcross
	Northcross	North Harbour West	New Lynn South	North Harbour West
	North Harbour West	Ocean View	Target Road	Sturges North
	Glenfield Central	Glenfield North	Waimumu North	Westlake
	Glenfield North	Mcleod	Glendene South	Glenfield North
	Unsworth Heights	Chelsea	Lynnmall	Pinehill
Auckland	Auckland Central West	Auckland Central East	Hillsborough West	Auckland Central West
	Auckland Central East	Auckland Central West	Lynfield North	Auckland Central East
	Hillsborough West	Hillsborough West	Auckland Central West	Auckland Harbourside
	Lynfield North	Epsom Central	New Windsor	Lynfield North
	New Windsor	Mt St John	Avondale South	Grafton West
	Avondale South	New Windsor	Glenavon	Newmarket
	Akarana	Akarana	Lynfield South	Hillsborough West
	Glenavon	Meadowbank South	Akarana	Mt St John
	Blockhouse Bay	Epsom North	Blockhouse Bay	Hamlin
	Mt St John	Royal Oak	Auckland Central East	Ferndale

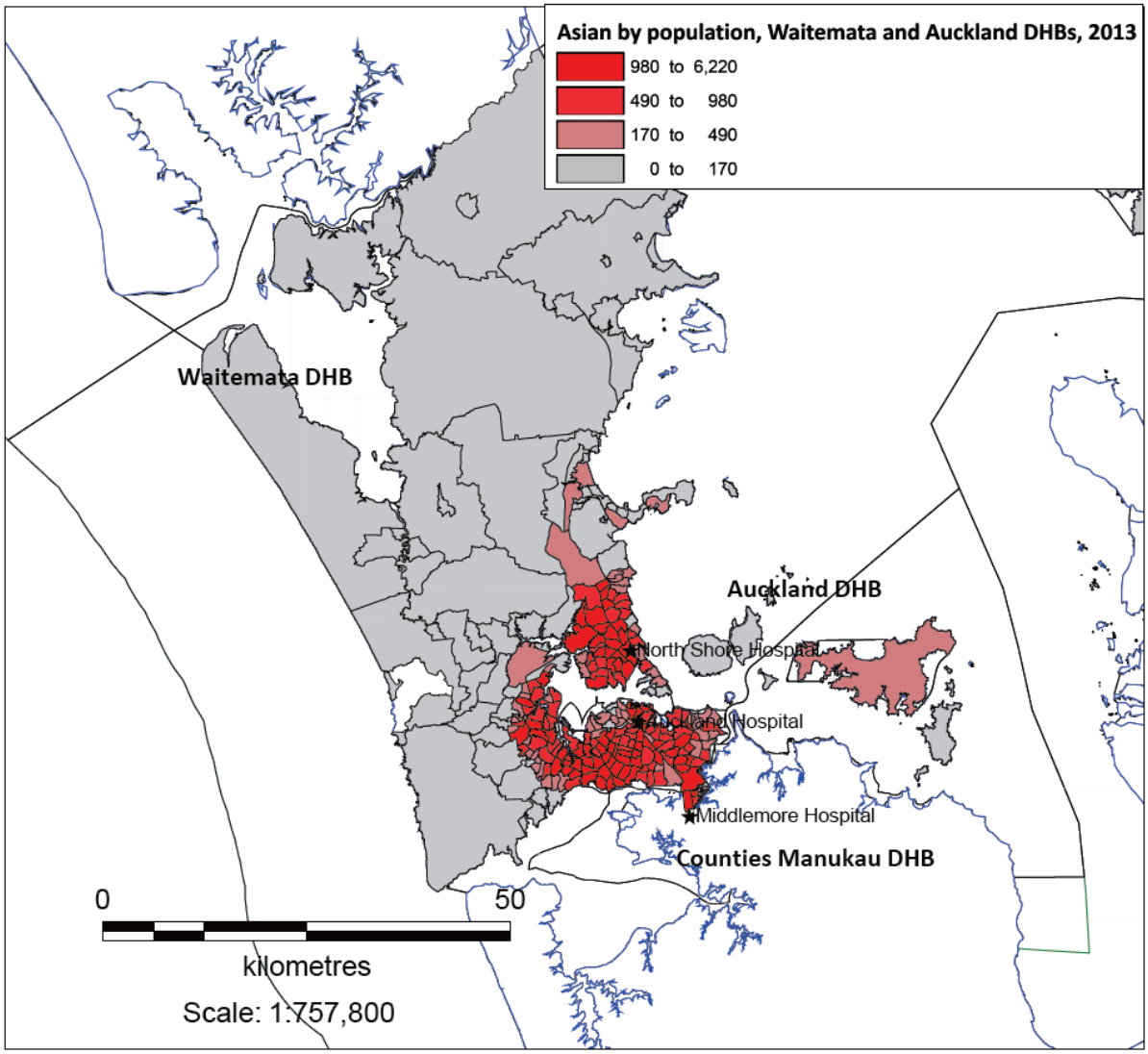


Figure 11 Geographical distribution of Asian in Waitemata and Auckland DHBs, CUR 2013

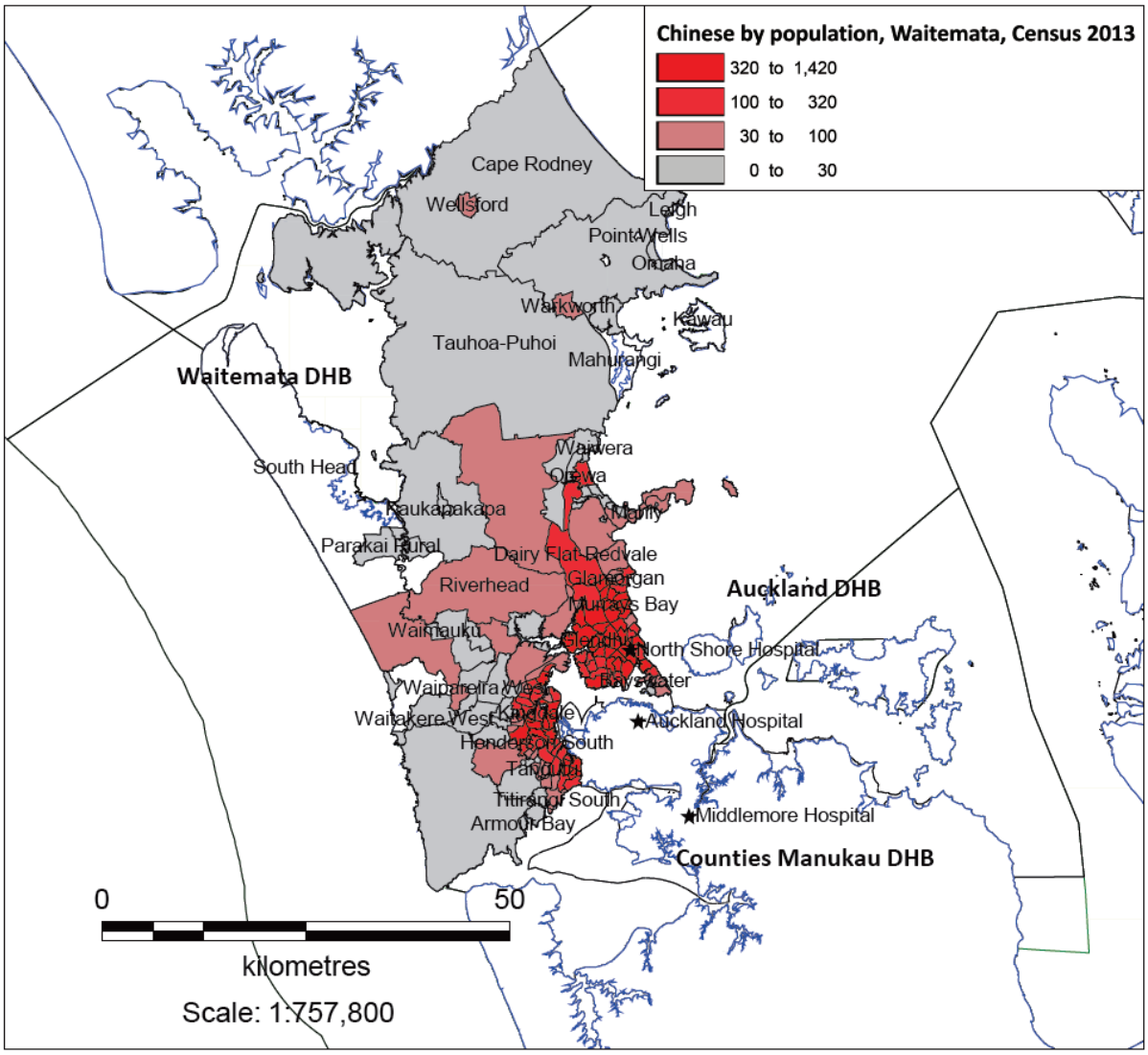


Figure 12 Geographical distribution of Chinese in Waitemata DHB, CUR 2013

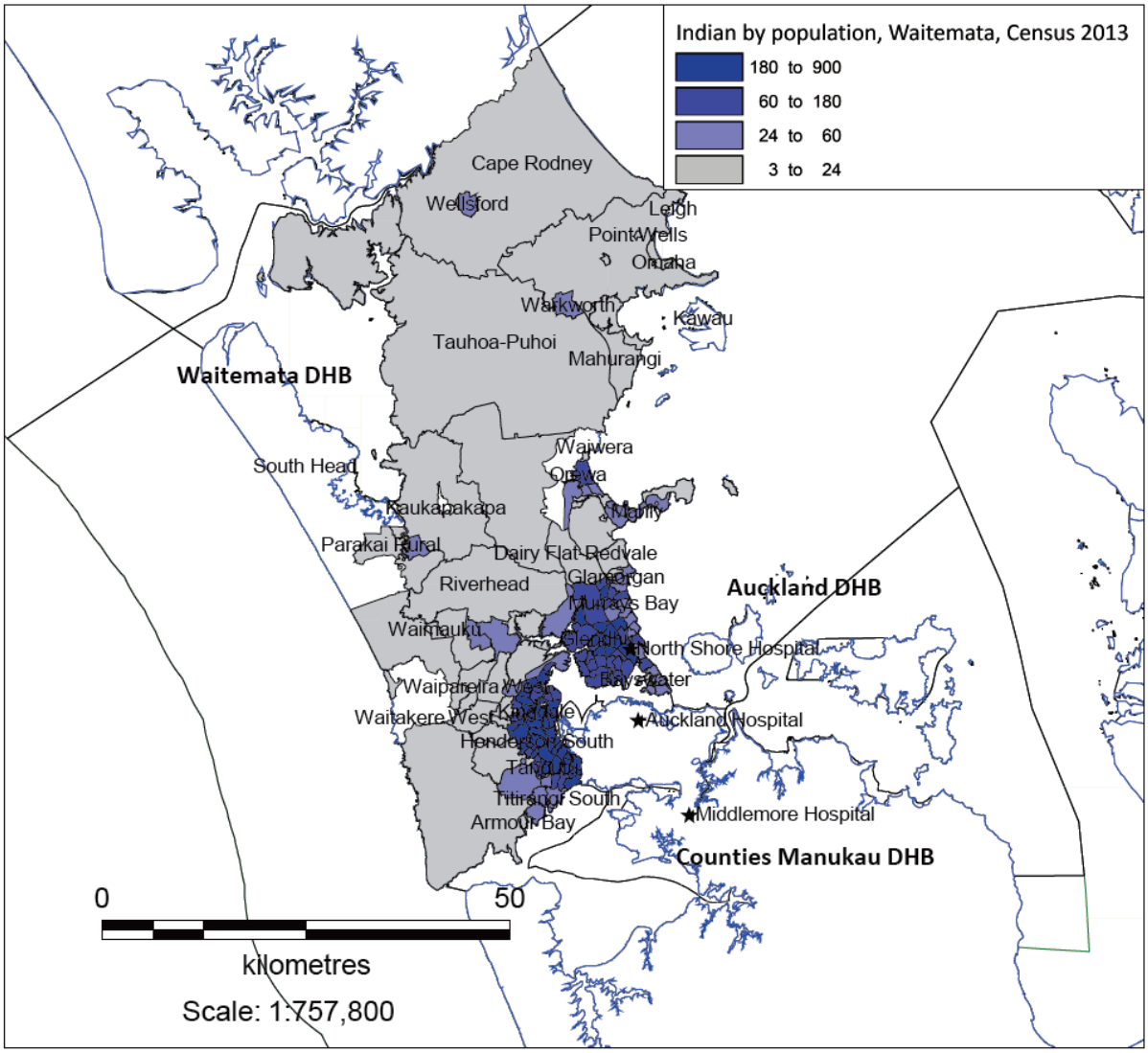


Figure 13 Geographical distribution of Indian in Waitemata DHB, CUR 2013

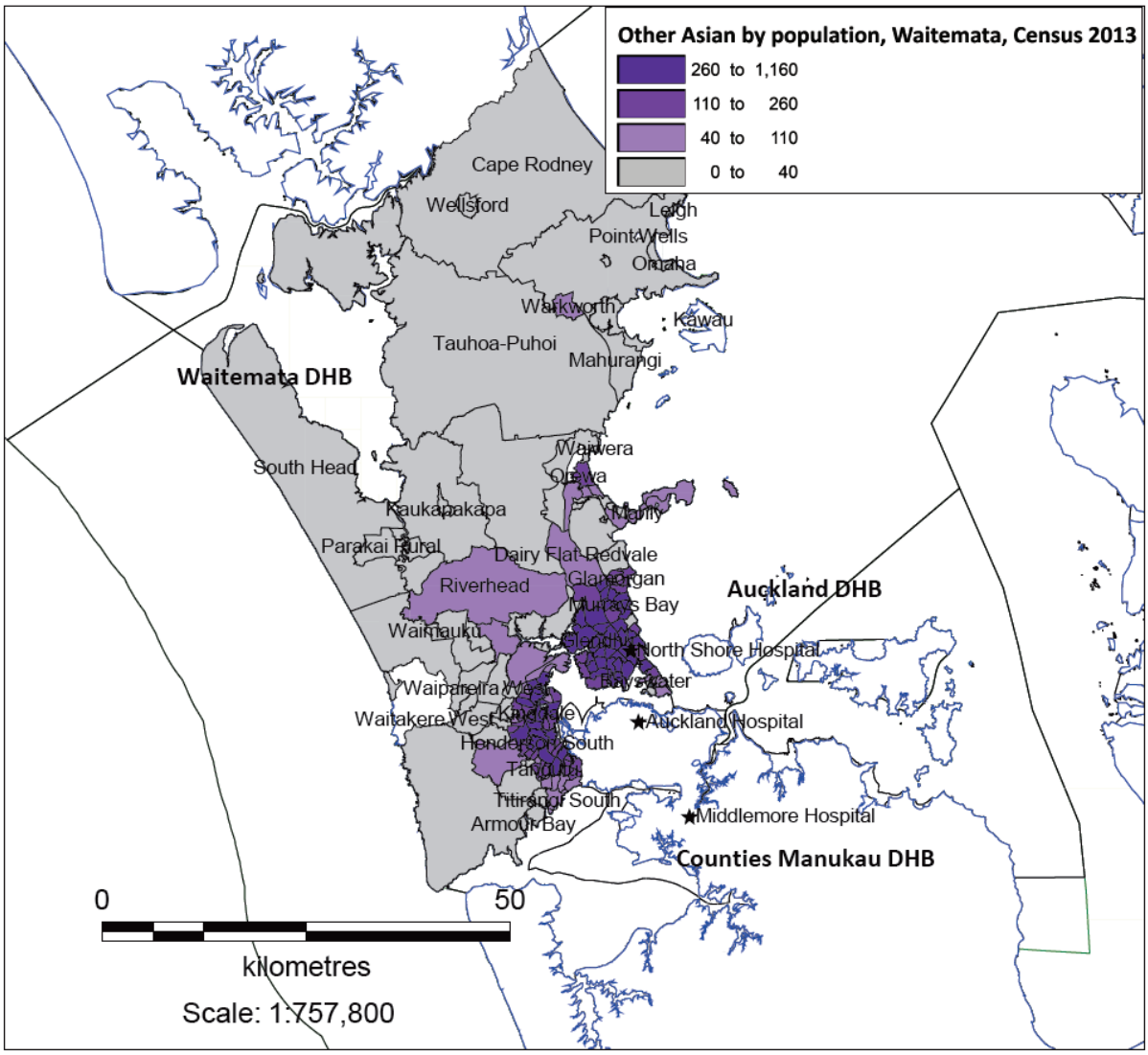


Figure 14 Geographical distribution of Other Asian in Waitemata DHB, CUR 2013

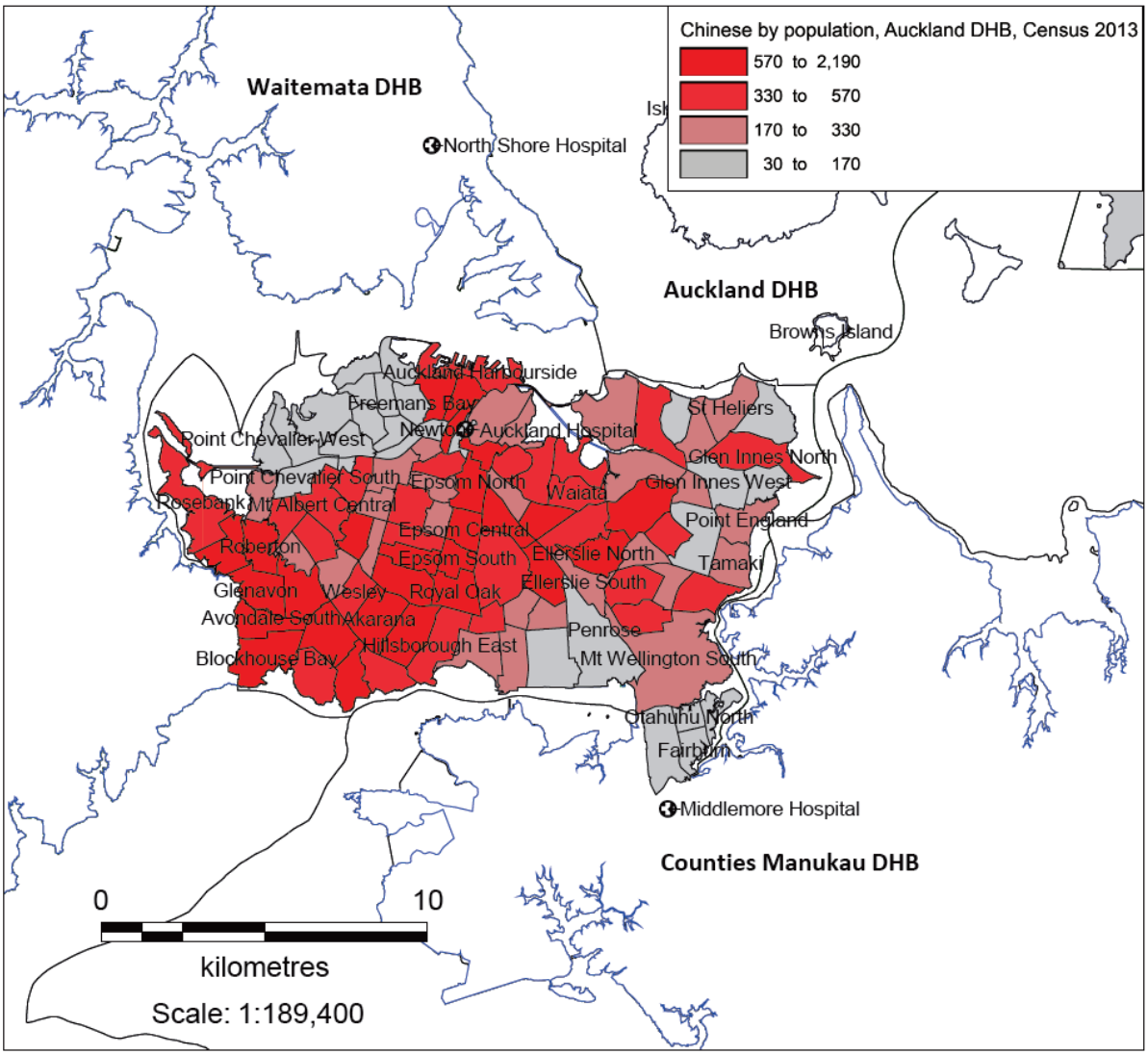


Figure 15 Geographical distribution of Chinese in Auckland DHB, CUR 2013

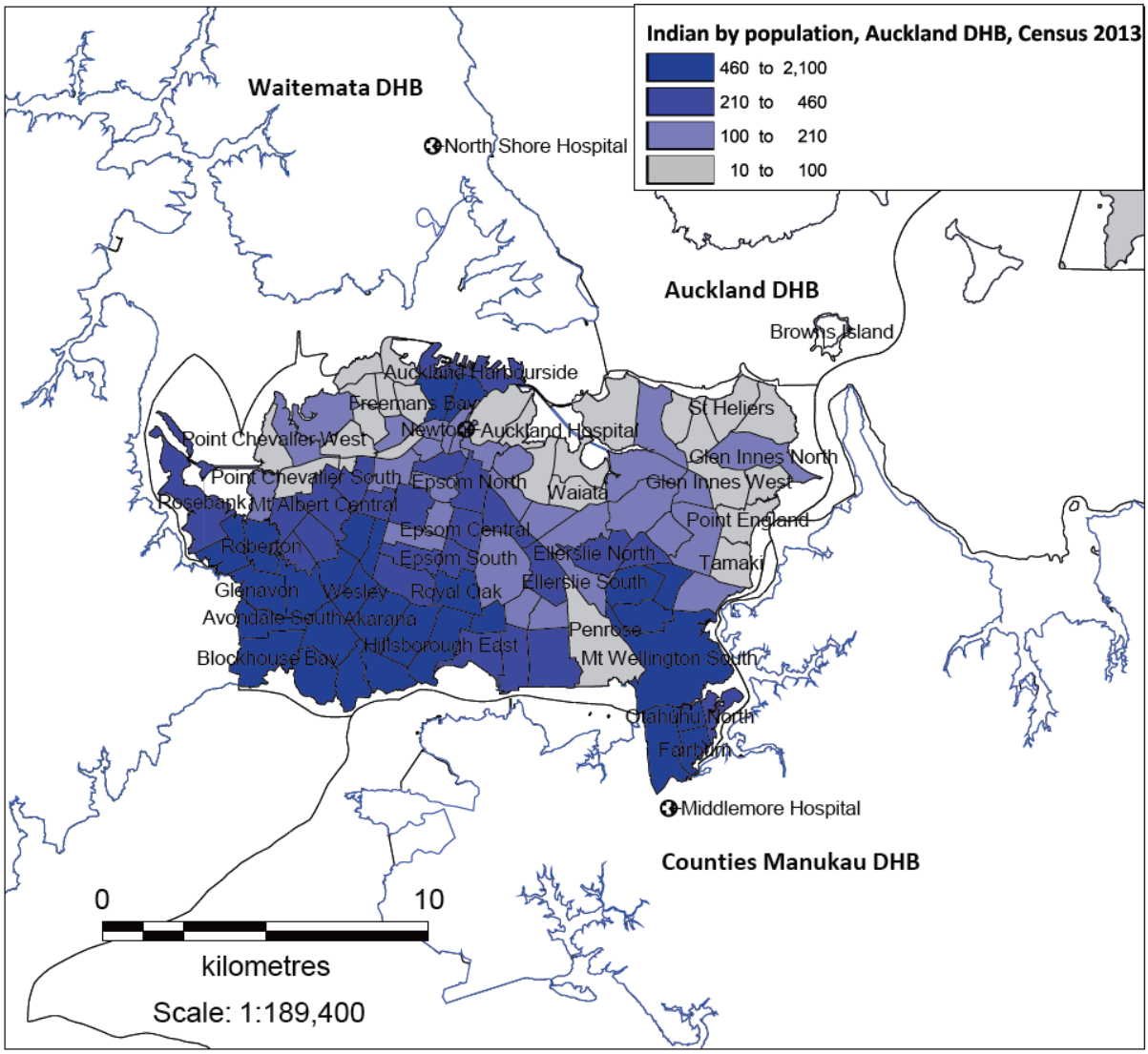


Figure 16 Geographical distribution of Indian in Auckland DHB, CUR 2013

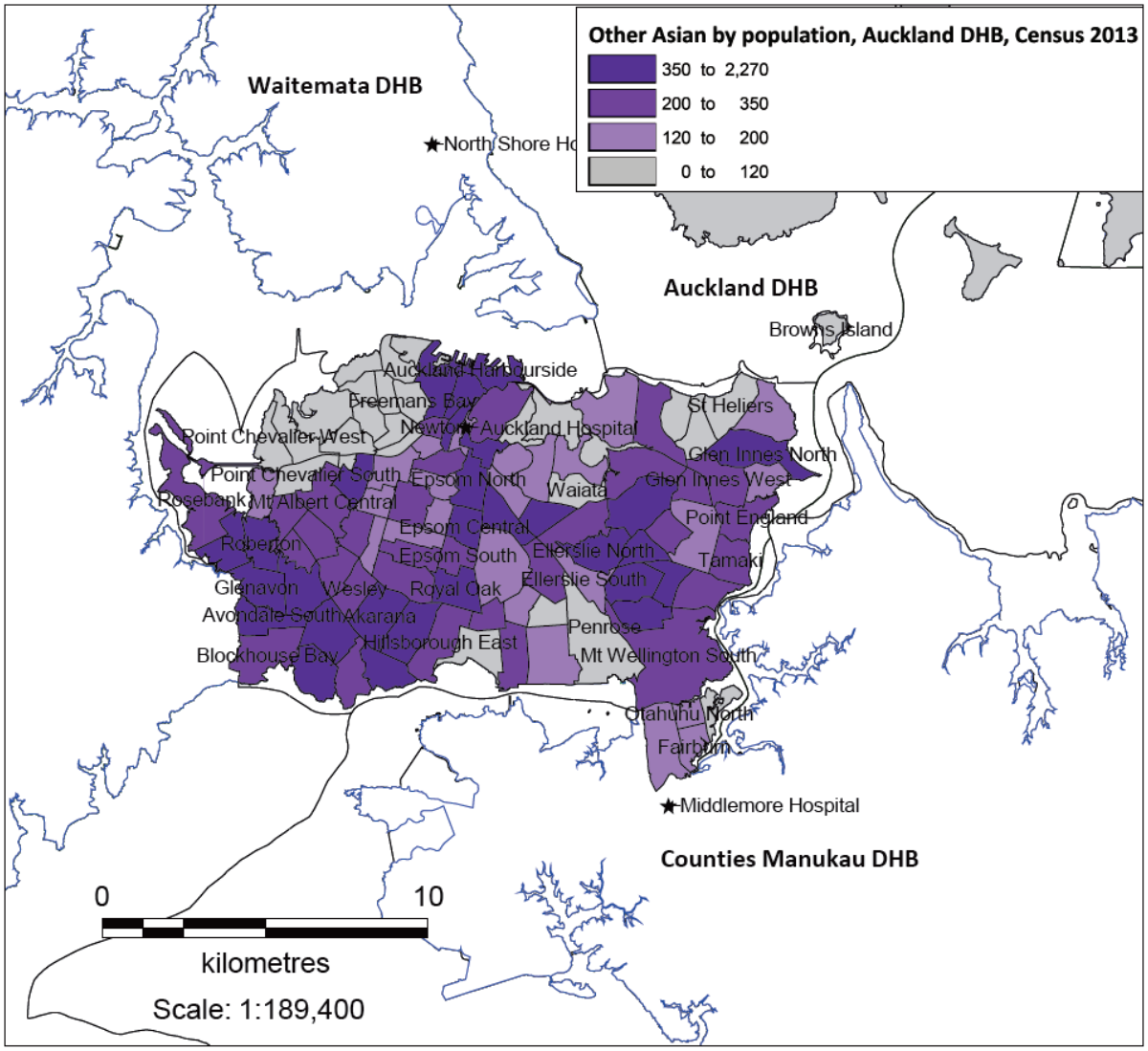


Figure 17 Geographical distribution of Other Asian in Auckland DHB, CUR 2013

Population projections for Asian as a whole

It was projected that Waitemata DHB would have the fastest Asian population growth in 20 years' time from 2013 to 2033, reaching 214,490 (growth rate: 113%), with the national Asian population becoming slightly more than one million (national average growth rate 95%), according to the medium projection series produced by Stats New Zealand ('2015 Update'). By 2033, the Asian population will likely make up 28% to 39% of the total population for Waitemata and Auckland DHBs. Nationwide, the Asian population will account for 19% of the total by 2033.

Table 11 Projections of Asian population by DHB, proportion of the total and size of population

	Year	Auckland	Waitemata	Counties Manukau	New Zealand
Proportion	2013	27.8%	18.2%	22.2%	11.7%
	2018	32.0%	22.1%	25.4%	14.3%
	2023	34.5%	24.5%	26.7%	16.0%
	2028	36.8%	26.6%	27.7%	17.4%
	2033	38.8%	28.4%	28.5%	18.8%
Size	2013	127,980	100,550	110,140	521,010
	2018	167,690	135,500	141,310	687,965
	2023	194,540	161,880	158,690	799,380
	2028	222,460	188,420	175,110	909,980
	2033	250,030	214,490	190,140	1,017,250

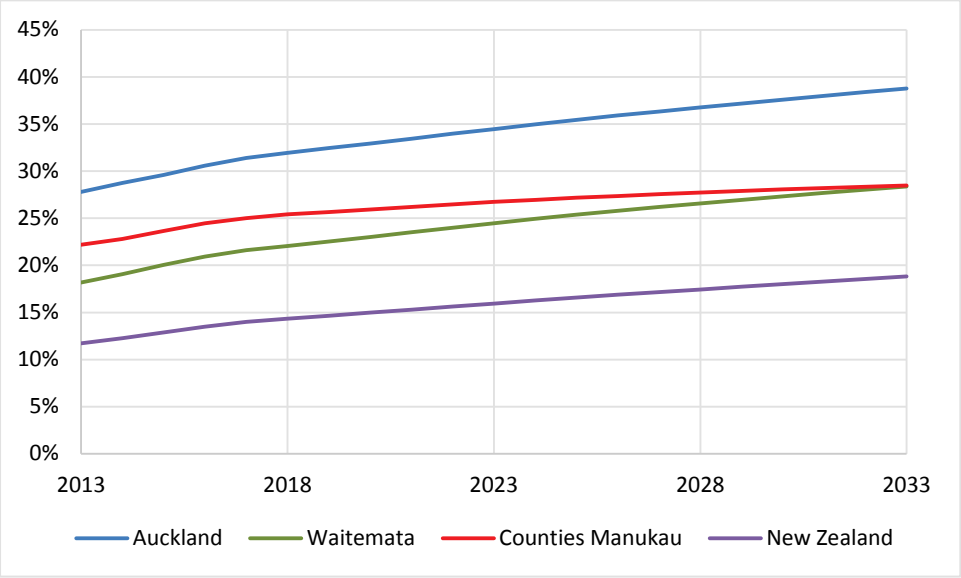


Figure 18 Proportion of Asian population (%) by year

The proportion of Asian people more than 65 years will increase from approximately 6% for both Waitemata and Auckland DHBs in 2013 to 11% for Auckland and close to 13% for Waitemata DHB in 2033. While these proportions are lower than the New Zealand average 22%, there will be higher health needs for the Asian population, when we take into account the size of the population, language and cultural, and service access factors.

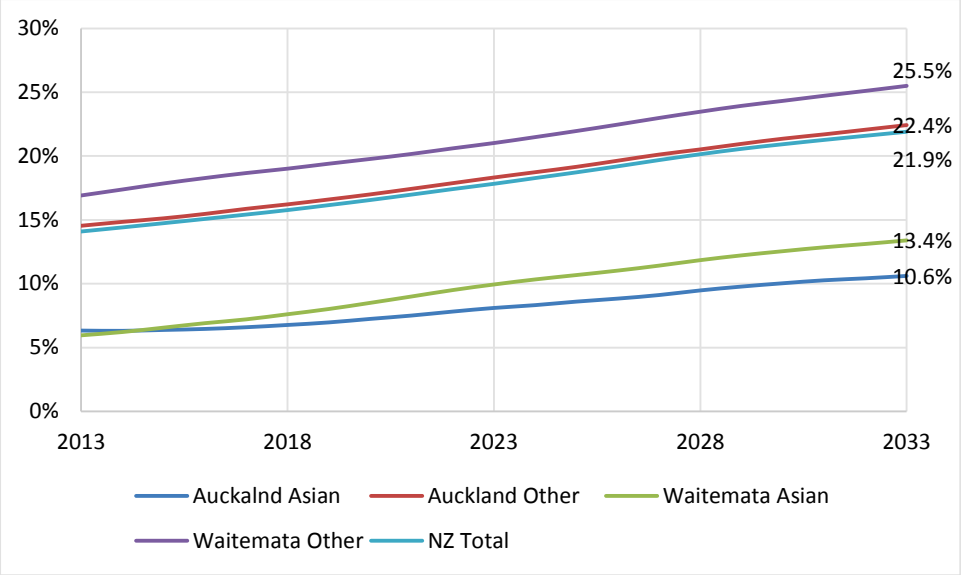


Figure 19 Proportion of population 65+ years for Asian and Other, Waitemata and Auckland DHBs

The proportion of children (<15 years) is projected to remain largely the same in 20 years' time as it was in 2013 for the Asian population in both DHBs (15%-16% in Auckland DHB and 20% in Waitemata DHB). There will be a 3% drop in the proportion of children in the national population from 21% to 18% in the meantime, however, which is aligned with ageing of the population, as suggested above.

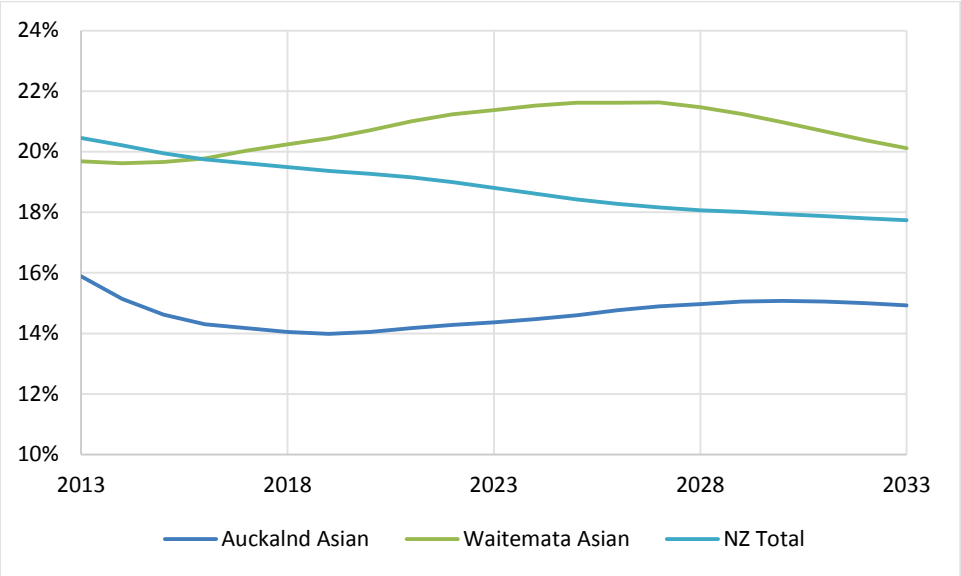


Figure 20 Proportion of children for Asian, Waitemata and Auckland DHBs

By having two population pyramids of two time periods side by side, we can also see the change of age structure by sex.

There will be higher proportions of people aged 20-50 years old, less of people aged more than 65 years old or younger than 15 years old in Auckland DHB than Waitemata DHB. Higher migration rates to Auckland DHB in these age groups provide some explanation for this.

Figure 21 Asian population pyramids, Waitemata and Auckland DHBs, 2013 and 2033

Demography at country level

China and India have the largest populations in the world and this also applies in this comparison as well. India had a higher proportion of children aged less than 15 years (29%), 9% higher than that of New Zealand. India and China had a smaller population over 60 years. The population pyramids provide more information by age group and sex, and suggest the potential population growth as well. The median age of New Zealanders is comparable to that of China and Australia, older than that of India, but younger than Canada, UK, Korea and Singapore.

Table 12 Population size and age structure by country (2013)

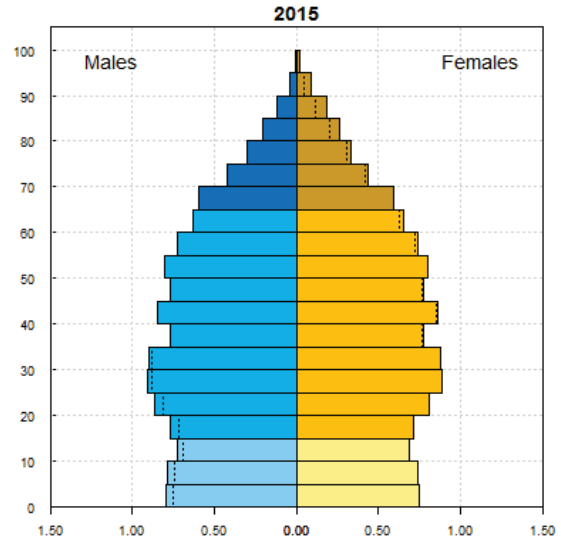
Country	Population (in thousands) total	Population proportion under 15 (%)	Population proportion over 60 (%)	Population median age (years)	Population living in urban areas (%)	Population living on <$1 (PPP int. $) a day (%)
Australia	23,343	19	20	37	89	
Canada	35,182	16	21	40	82	<2.0
China	1,393,337	18	14	37	53	6
India	1,252,140	29	8	26	32	25
New Zealand	4,506	20	19	37	86	
Republic of Korea	49,263	15	17	39	82	
Singapore	5,412	16	16	38	100	
United Kingdom	63,136	18	23	40	82	<2.0

Source: http://apps.who.int/gho/data/view.main.POP2040ALL?lang=en, accessed 10 February 2016

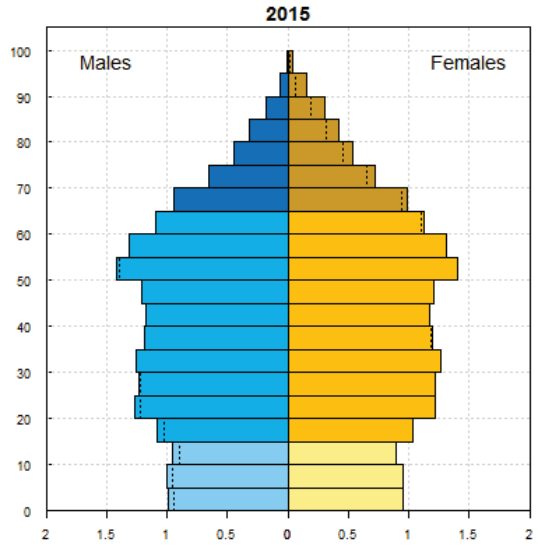
The table below summarises the size of the Asian population and its contribution to the total population of that country (there are more details of the Asian populations of Australia, Canada and the UK in the coming sections).

Table 13 Size and proportion of Asian population by country

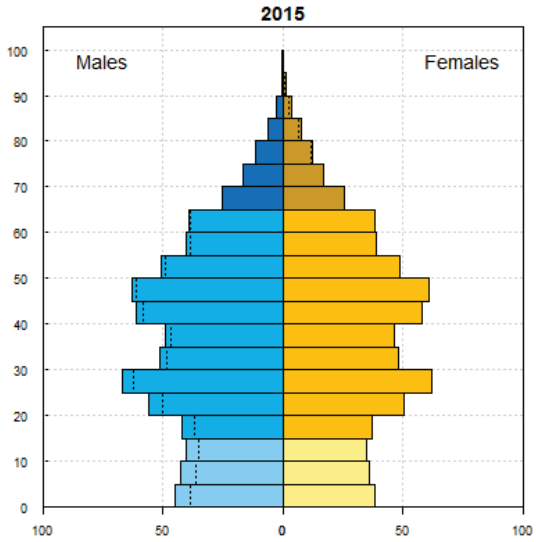
Country	Asian population (in thousands)	Proportion of the total population (%)	Year	Data source and comments
China	1,393,337	100%	2013	Global health observatory, WHO
India	1,252,140	100%	2013	Global health observatory, WHO
Republic of Korea	49,263	100%	2013	Global health observatory, WHO
Singapore	5,412	100%	2013	Global health observatory, WHO
Australia	1,538	6.5%	2015	Based on the top 10 countries of birth
Canada	4,279	13.0%	2011	Visible minority populations of South Asian, Chinese, Filipino, Southeast Asian, West Asian, Korean and Japanese
The UK	4,214	7.5%	2011	England and Wales, Census 2011
New Zealand	521	11.7%	2013	Estimated population



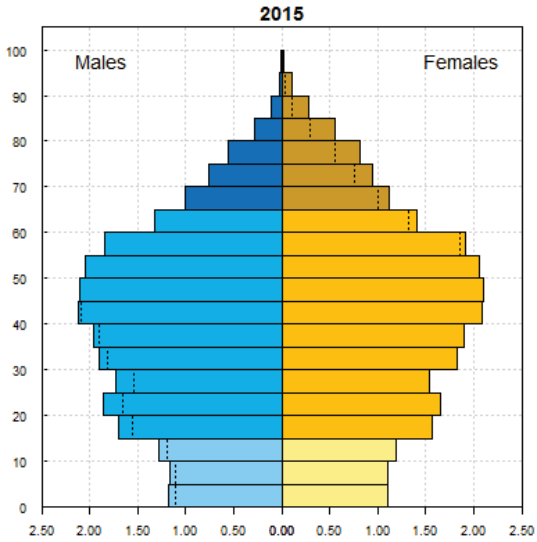
Australia



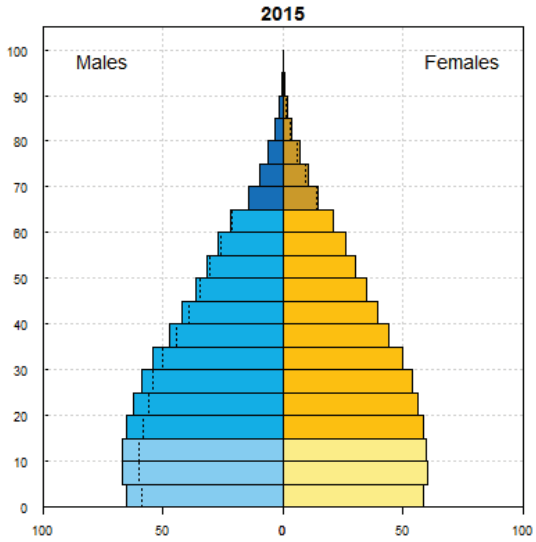
Canada



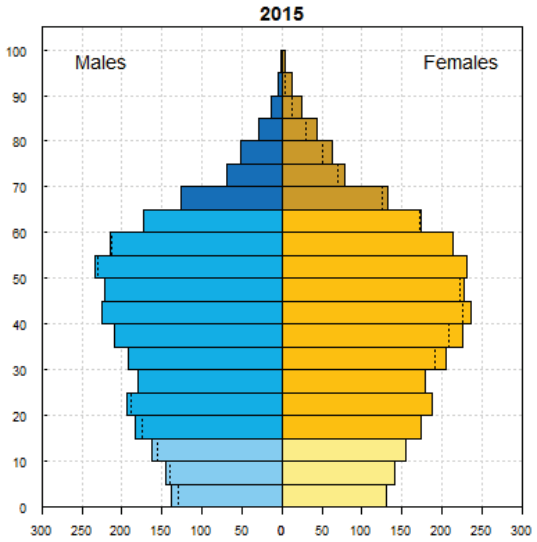
China



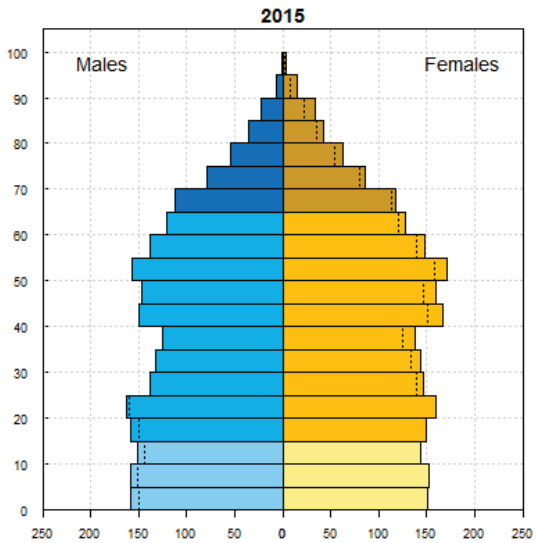
Korea



India



Singapore



New Zealand

Source: http://esa.un.org/unpd/wpp/Graphs/DemographicProfiles/, accessed 11 April 2016

The dotted line indicates the excess male or female population in certain age groups. The data are in thousands for Singapore and New Zealand, in millions for other countries.

Figure 22 Population pyramids by country, 2015

There were more males than females in China and India (6.3% for China and 7.6% for India), whereas in other countries including New Zealand there are more females. New Zealand had the lowest sex ratio of the total population; there were only 96 males per 100 females in New Zealand. The sex ratio also varied by age group (and ethnicity as well, but data not shown here) (***Figure 22***, **Table 14**).

Table 14 Sex ratio of the total population by country

Country	**2005**	**2010**	**2015**
Australia	99.6	100.1	99.9
Canada	98.3	98.4	98.4
China	105.9	106.1	106.3
India	107.6	107.7	107.6
New Zealand	96.0	96.4	95.6
Republic of Korea	99.9	99.0	98.8
Singapore	98.5	97.4	97.4
United Kingdom	95.9	96.6	97.2

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

The total dependency ratio estimates the burden of the dependent populations (the number of children (0-14 years old) and older persons (65 years or over)) by the working-age population (15-64 years old)[9], which is related to social and economic development, and has implications for social support needs and use of health care services. New Zealand had a higher total dependency ratio than most other countries except for the United Kingdom in 2015. China, Korea and Singapore had comparable ratios, sitting at around 37%.

Ageing is a global issue with countries such as Korea and Singapore experiencing key trends that impact on sustainable social and economic development: 1) low birth rate, 2) increasing size of ageing population, 3) ageing of the Aged Population, and 4) feminisation of the aged Population, e.g. more females outlive males aged 65 years and above (more significant for age group 85 years and above). The old age dependency ratio measures the burden of the population 65+ years old on the working population 15-64 years old. The ratio for New Zealand was 23% in 2015, similar to that of Australia, Canada and the UK, but much higher than India and China (**Table 16**).

9 http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/demographics/dependency_ratio.pdf, accessed 12 April 2016

Table 15 Total dependency ratio (ratio of population aged 0-14 and 65+ per 100 population 15-64 years) by country

Country	2005	2010	2015
Australia	48.6	48.2	50.9
Canada	44.5	44.1	47.3
China	38.1	34.5	36.6
India	60.2	56.3	52.4
New Zealand	50.6	50.4	54.0
Republic of Korea	38.4	37.6	37.2
Singapore	37.7	35.8	37.4
United Kingdom	51.5	51.2	55.1

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

Table 16 Old-age dependency ratio (ratio of population aged 65+ per 100 population 15-64 years) by country

Country	2005	2010	2015
Australia	19.2	20.0	22.7
Canada	18.9	20.4	23.8
China	10.3	11.1	13.0
India	7.7	8.0	8.6
New Zealand	18.1	19.6	22.9
Republic of Korea	12.7	15.3	18.0
Singapore	11.3	12.2	16.1
United Kingdom	24.2	24.5	27.6

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

The total fertility rates of the countries included in this report were relatively low; and the country with the highest rate was India at 2.48 per woman in 2015. The rate for New Zealand was just at about the replacement level (2.05 per woman) (***Figure 23***,**Table 17**).

The mean age of child bearing for New Zealand (approximately 30 years) was close to all other countries except for China and India (both at slightly more than 26 years) (**Table 18**).

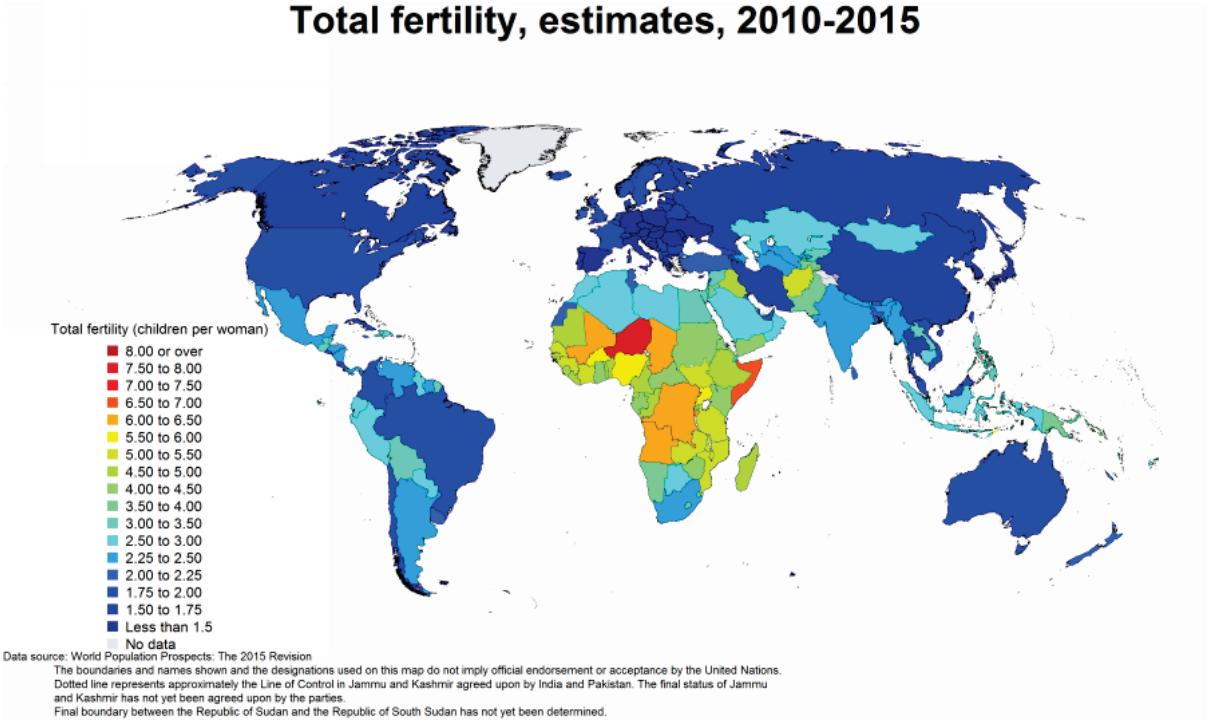


Figure 23 Total fertility rate, world, 2010-2015

Table 17 Total fertility (children per woman) by country

Country	2000-2005	2005-2010	2010-2015
Australia	1.77	1.95	1.92
Canada	1.52	1.64	1.61
China	1.50	1.53	1.55
India	3.14	2.80	2.48
New Zealand	1.95	2.14	2.05
Republic of Korea	1.22	1.23	1.26
Singapore	1.35	1.26	1.23
United Kingdom	1.66	1.88	1.92

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

Table 18 Mean age of childbearing (years) by country

Country	2000-2005	2005-2010	2010-2015
Australia	29.78	30.26	30.54
Canada	29.31	29.78	30.27
China	26.15	26.24	26.33
India	26.83	26.65	26.49
New Zealand	29.38	29.56	29.81
Republic of Korea	29.34	30.25	31.34
Singapore	30.10	30.55	31.21
United Kingdom	28.81	29.28	29.96

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

Canada, Australia and the UK had large net migration populations. Even though record net migration was recorded in 2015-16 for Auckland DHB (insert) and Waitemata DHB (insert), overall New Zealand recorded the number was small relative to its population (0.3 per 1000 person years over the time period). Singapore, Australia and Canada had large net migration rates (**Table 19**, **Table 20**). Of note, the net number of migrants does not reflect the population size of immigrants.

Table 19 Net number of migrants*, both sexes combined (thousands) by country

Country	2000-2005	2005-2010	2010-2015
Australia	575	1,133	1,023
Canada	1,027	1,230	1,176
China	-2,144	-2,202	-1,800
India	-2,206	-2,829	-2,598
New Zealand	135	62	7
Republic of Korea	229	405	300
Singapore	436	449	398
United Kingdom	968	1,524	900

* The net number of migrants is the number of immigrants minus the number of emigrants.

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

Table 20 Net migration rate* (per 1,000 population of the receiving country) by country

Country	2000-2005	2005-2010	2010-2015
Australia	5.8	10.7	8.9
Canada	6.5	7.4	6.7
China	-0.3	-0.3	-0.3
India	-0.4	-0.5	-0.4
New Zealand	6.7	2.9	0.3
Republic of Korea	1.0	1.7	1.2
Singapore	20.7	18.8	14.9
United Kingdom	3.3	5.0	2.8

* The number of immigrants minus the number of emigrants over a period, divided by the person-years lived by the population of the receiving country over that period.

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

General health

Life expectancy at birth reflects the overall mortality level of a population, estimating the average number of years that a new-born is expected to live if current mortality rates hold true. It is important to capture both fatal and non-fatal health outcomes in a summary measure of average levels of population health. According to WHO, 'Healthy life expectancy (HALE) at birth adds up expectation of life for different health states, adjusted for severity distribution making it sensitive to changes over time or differences between countries in the severity distribution of health states' (WHO, 2016).

New Zealand had comparable life expectancies to other high income countries according to Global Health Observatory of the WHO. Singaporeans enjoyed the highest life expectancies for females and males (just one year higher than those of New Zealanders), whereas India's life expectancies at birth were the lowest (less than 70 years) (**Table 21**). Singaporeans also had the highest HALE at birth for both females and males, while Indians originating from India and Chinese of China had the lowest HALE at birth (less than 60 years for India and less than 70 for China).

Table 21 Life expectancy at birth (years) by sex at country level, 2013

Country	Total	Female	Male
Australia	83	85	80
Canada	82	84	80
China	75	77	74
India	66	68	65
New Zealand	**82**	**84**	**80**
Republic of Korea	82	85	78
Singapore	83	85	81
United Kingdom	81	83	79

Source: http://apps.who.int/gho/data/node.main.688, accessed 10 Feb. 2016

Table 22 Healthy life expectancy (HALE) at birth (years) by sex at country level, 2013

Country	Total	Female	Male
Australia	73	74	71
Canada	72	73	71
China	68	69	67
India	58	59	56
New Zealand	**72**	**73**	**71**
Republic of Korea	73	75	70
Singapore	76	78	75
United Kingdom	71	72	69

Source: http://apps.who.int/gho/data/node.main.688, accessed 10 Feb. 2016

Asians in Waitemata and Auckland DHBs had higher life expectancies as compared to their European/other counterparts, for both females and males; the life expectancies for Asians residing in Waitemata DHB were the highest. By Asian sub-group, Chinese in Waitemata DHB had the highest life expectancy at birth followed by Indian and Other Asians (including Korean and South-East Asians).

Figure 24 compares the life expectancy at birth of the Asians in Waitemata and Auckland DHBs and peoples of other countries of interest with the aim to see a trend of rank, acknowledging potential discrepancy of data sources (deaths and population), years of the data and calculation methods (e.g. whether or not using hierarchical Bayesian models for dealing with random variation of death rates (Statistics New Zealand, 2015)).

Table 23 Life expectancy at birth by sex and ethnicity (prioritised), 2012-14 combined, Waitemata and Auckland DHBs

DHB	Sex	Māori	Pacific	Asian	European/Other
Waitemata	Female	81.9	81.8	91.6	87.2
	Male	78.2	77.5	88.9	83.6
	Total	80.1	79.8	90.3	85.5
Auckland	Female	81.1	80.3	90.3	86.2
	Male	77.4	76.2	87.7	82.7
	Total	79.4	78.4	89.1	84.5

Source:http://www.stats.govt.nz/browse_for_stats/health/life_expectancy/period-life-tables.aspx#dhb, accessed 23 March 2016

Table 24 Life expectancy at birth by Asian sub-group (prioritised), 2010-12 combined, Waitemata and Auckland DHBs

DHB	Prioritised ethnicity	Female and male combined (95%CI)		
Waitemata	European/Other	83.7	83.5	84.0
	Asian	90.0	89.2	90.9
	Chinese	92.9	91.6	94.2
	Indian	89.9	87.8	92.1
	Other Asian	86.8	85.4	88.3
Auckland	European/Other	82.6	82.3	82.9
	Asian	86.8	86.3	87.4
	Chinese	88.0	87.2	88.8
	Indian	85.8	84.7	86.8
	Other Asian	85.1	83.6	86.6

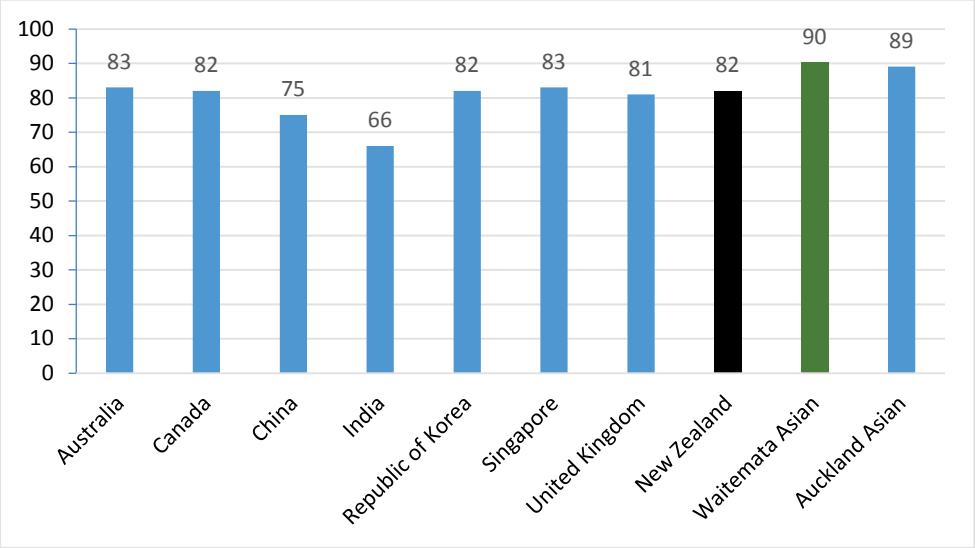


Figure 24 Life expectancy at birth, DHBs and countries

All causes disease burden

The Department of Health Statistics and Information Systems of the WHO provides a comprehensive and comparable set of measures of burden of disease and injuries since 2000, collaborating with the UN agencies and GBD 2010 team (for YLD analyses) led by the Institute for Health Metrics and Evaluation at the University of Washington (WHO, 2013). Further improvements were made since GBD 2010 and IHME has improved access to the wide range of indicators (IHME, 2016). A new series of research papers of 'GBD 2013' have since been published on the Lancet.

According to WHO, the GBD 2010 results presented in the Lancet papers were similar to WHO's estimates, while there were also significant differences between GBD 2010 and WHO/UN interagency groups in other areas. At the time when WHO published its technical paper in 2013, WHO did not endorse the GBD 2010 results. A review and assessment of the reasons for the differences between WHO and GBD 2010 and GBD 2013 has not come out. However, it is thought the differences are probably multi-pronged, including data sources (vital data, estimated population, world population standards, epidemiological data and disability weights, cause codes and categories, and modelling methods).

Nevertheless, the relative ranks of death rates and years of life lost are considered to be robust, particularly from the same source. At country level, GBD 2010, GBD 2013 and WHO estimates are all used in this report. Mainly GBD 2010 results are used for comparisons with the indicators of Asians in Waitemata and Auckland DHBs.

World maps of fatal health loss, 2010

Figure 25 and ***Figure 26*** show the overall pictures of mortality rate and YLL rate of the world in 2010. The countries of interest are roughly blue or azure (India) (refer to the scale at the bottom of the maps). Both graphs show that New Zealand had lower mortality rate and YLL rate, relative to other countries in the world.

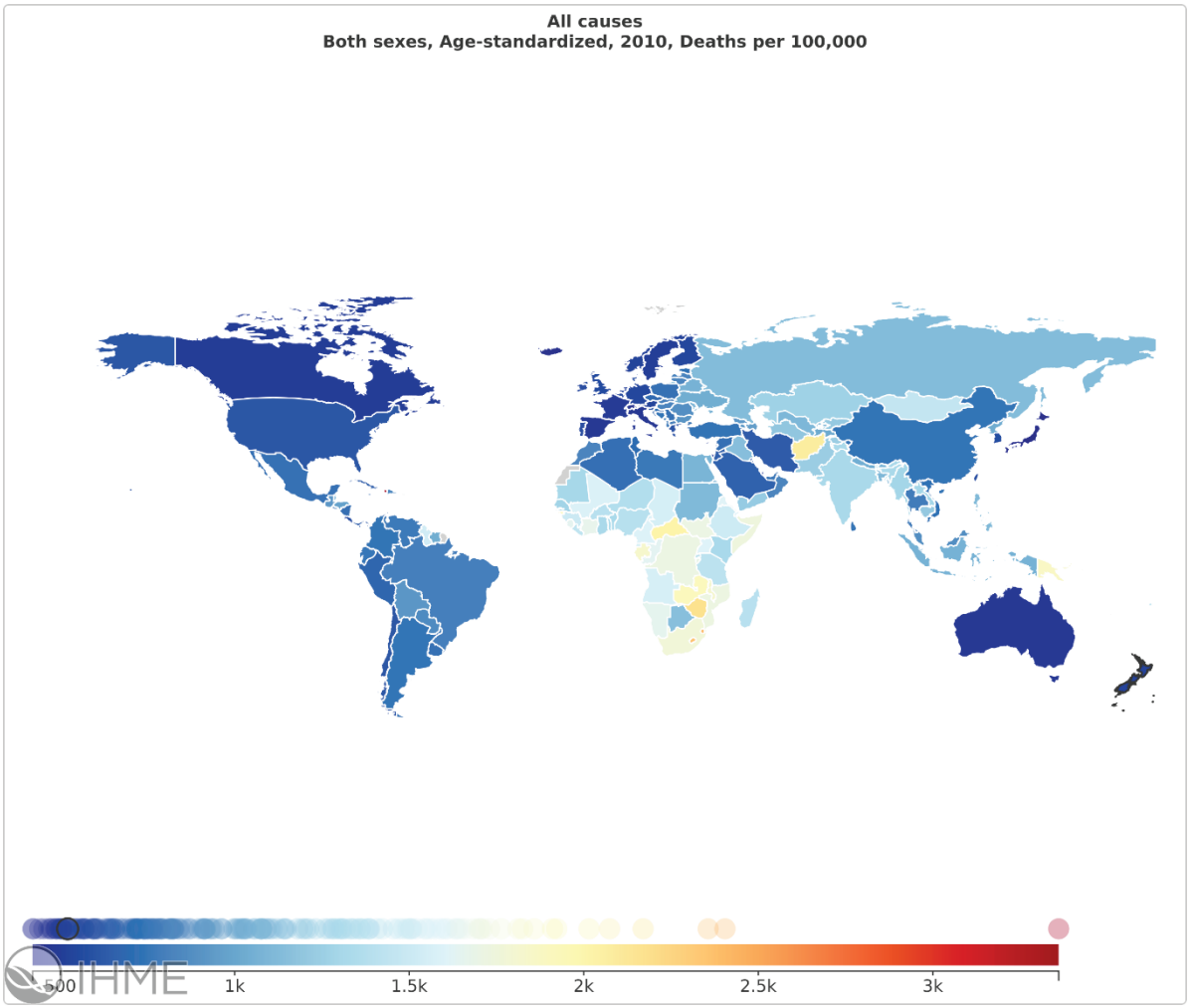


Figure 25 Age standardised mortality rate (per 100,000), World, both sexes, 2010

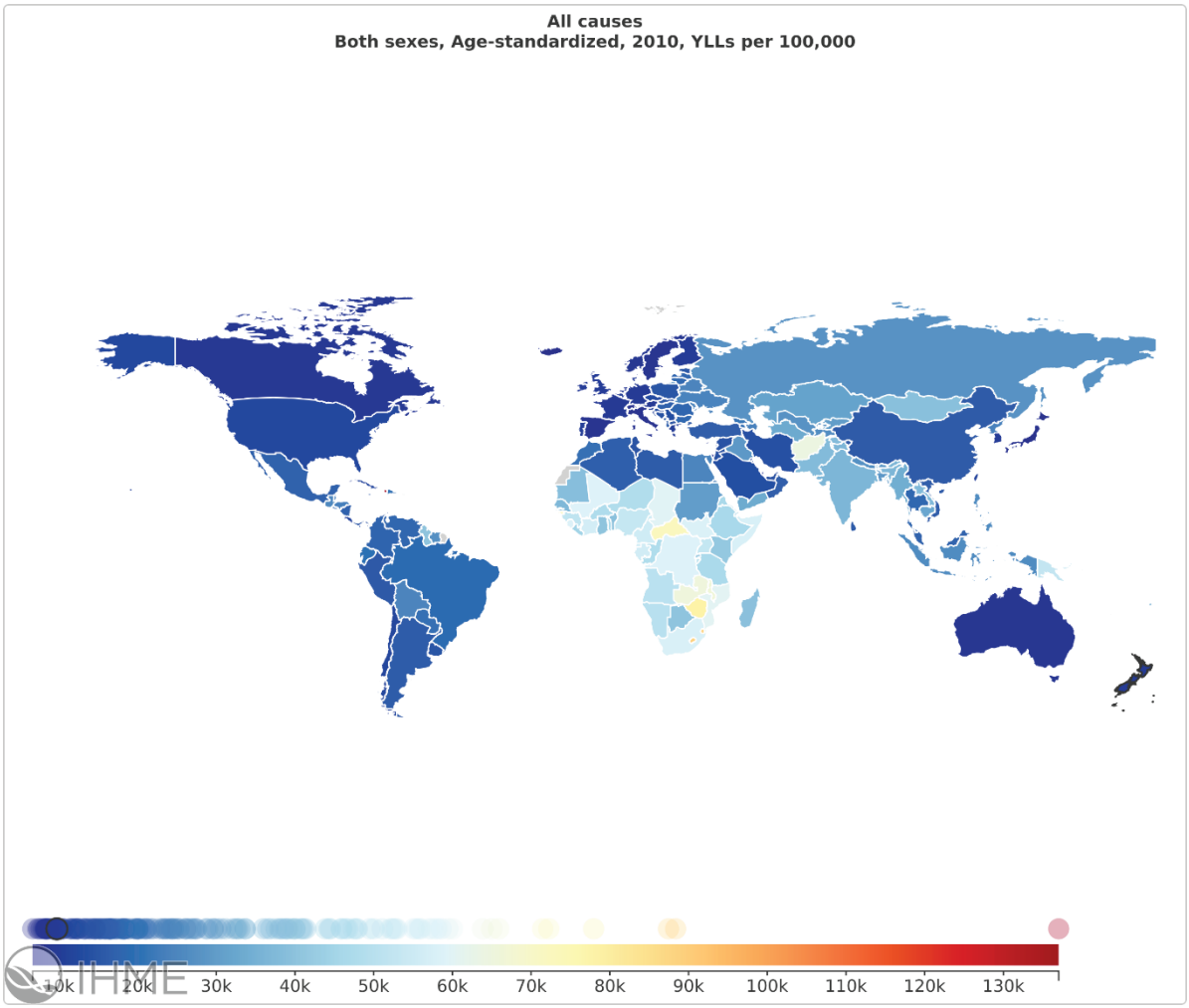


Figure 26 Age standardised YLLs (per 100,000), World, both sexes, 2010

Disease burden by major cause group, WHO/GHE 2012

Similar to most high income countries, non-communicable diseases accounted for more than 80% of the fatal health loss in New Zealand. Communicable, maternal, perinatal and nutritional conditions still played an important role in the fatal loss in India (42% of total years of life lost), while injuries accounted for 20% of total YLLs in the Republic of Korea (***Figure 27***).

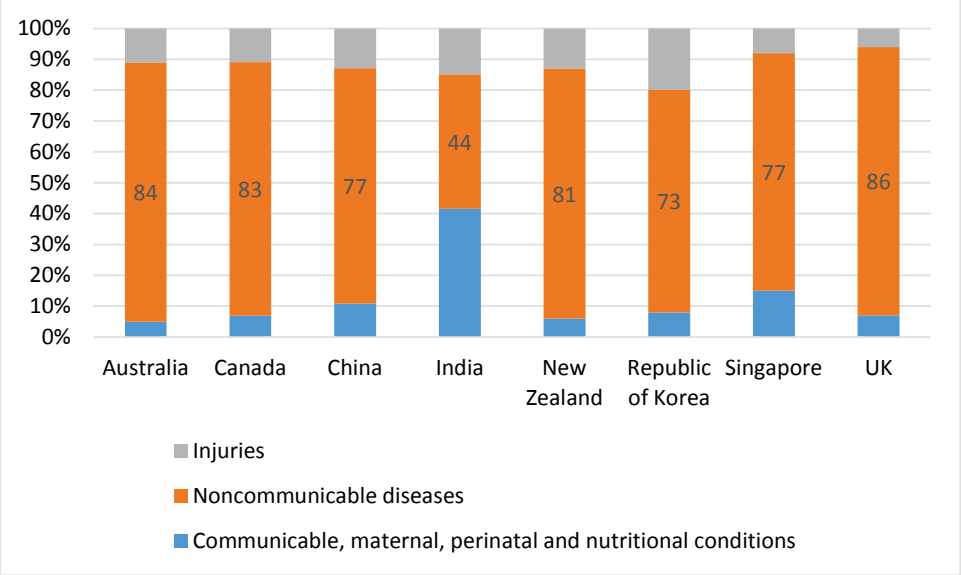


Figure 27 Distribution of YLLs by major cause group, 2012

New Zealand had comparable all-cause mortality rates with other high income countries and enjoyed almost the lowest mortality rate for communicable, maternal, perinatal and nutritional conditions. India had the highest mortality rates across the board.

Table 25 Age standardised rate of mortality by major cause group, 2012

Country	All Causes	Communicable, maternal, perinatal and nutritional conditions	Non-communicable diseases	Injuries
Australia	345	14	303	28
Canada	372	23	318	31
China	668	41	576	50
India	1,051	253	682	116
New Zealand	**365**	**18**	**314**	**33**
Republic of Korea	389	34	302	53
Singapore	349	66	265	18
UK	409	29	359	22

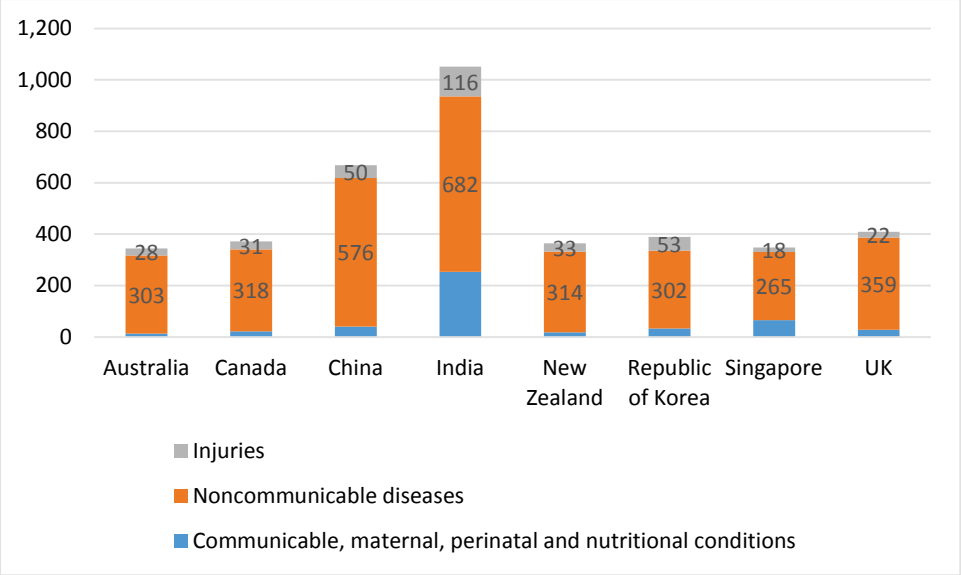


Figure 28 ASR of mortality by major cause group, 2012

New Zealand had the lowest rate of DALYs for communicable, maternal, perinatal and nutritional conditions, comparable rate for non-communicable diseases, but with a relatively higher injury rate of DALYs (still lower than the three main origin Asian countries of the Asian migrants living in New Zealand, namely China, India and Korea).

Table 26 Age standardised rate of DALYs by major cause group, 2012

Country	All Causes	Communicable, maternal, perinatal and nutritional conditions	Non-communicable diseases	Injuries
Australia	17,696	1,161	14,458	2,076
Canada	18,838	1,311	15,725	1,802
China	24,811	3,282	18,748	2,781
India	47,950	15,840	26,503	5,607
New Zealand	**18,742**	**1,157**	**15,164**	**2,420**
Republic of Korea	17,921	1,452	13,824	2,646
Singapore	14,354	1,641	11,555	1,159
UK	20,376	1,394	17,157	1,825

Burden of disease and injuries by country, GBD 2010

New Zealand had a similar ranking in age standardised mortality rates in the GBD 2010 study led by IHME, compared to the WHO's estimates (**Figure 29**). For age standardised DALYs, New Zealand ranked No. 4 in the WHO estimates, but ranked No. 5 in the GBD 2010 study, both data sources agreeing New Zealand did better than the UK, China and India. India's DALY rate was more than double that of New Zealand's in both sources. The rank for YLLs is the same as for mortality rate according to GBD 2010, with India having the highest rate of YLLs (close 36k per 100,000) followed by China (close to 16k per 100,000) and Korea (but still less than 10k per 100,000 as other high income countries).

As for YLDs, the rank by country is very different from those for mortality or YLL rates. New Zealand had a similar rate to the UK. Australia and India had the highest rate for YLDs, and China and Singapore were the leading countries from the list (***Figure 32***). It is unlikely that the non-fatal health burden was comparable between Australia and India or between China and Singapore. It is likely that the burden of health loss varies by cause, age group and sex between these countries.

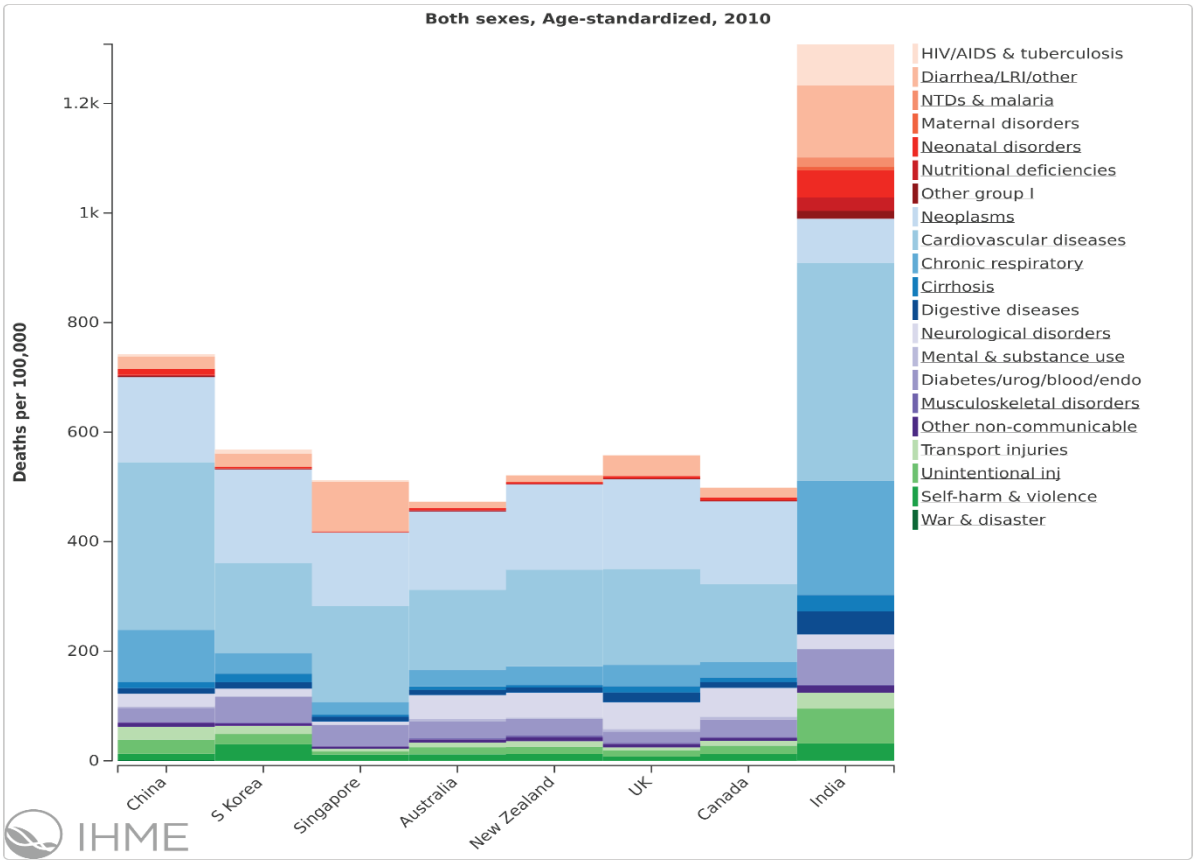


Figure 29 Age standardised mortality rate, all causes, both sexes, GBD 2010

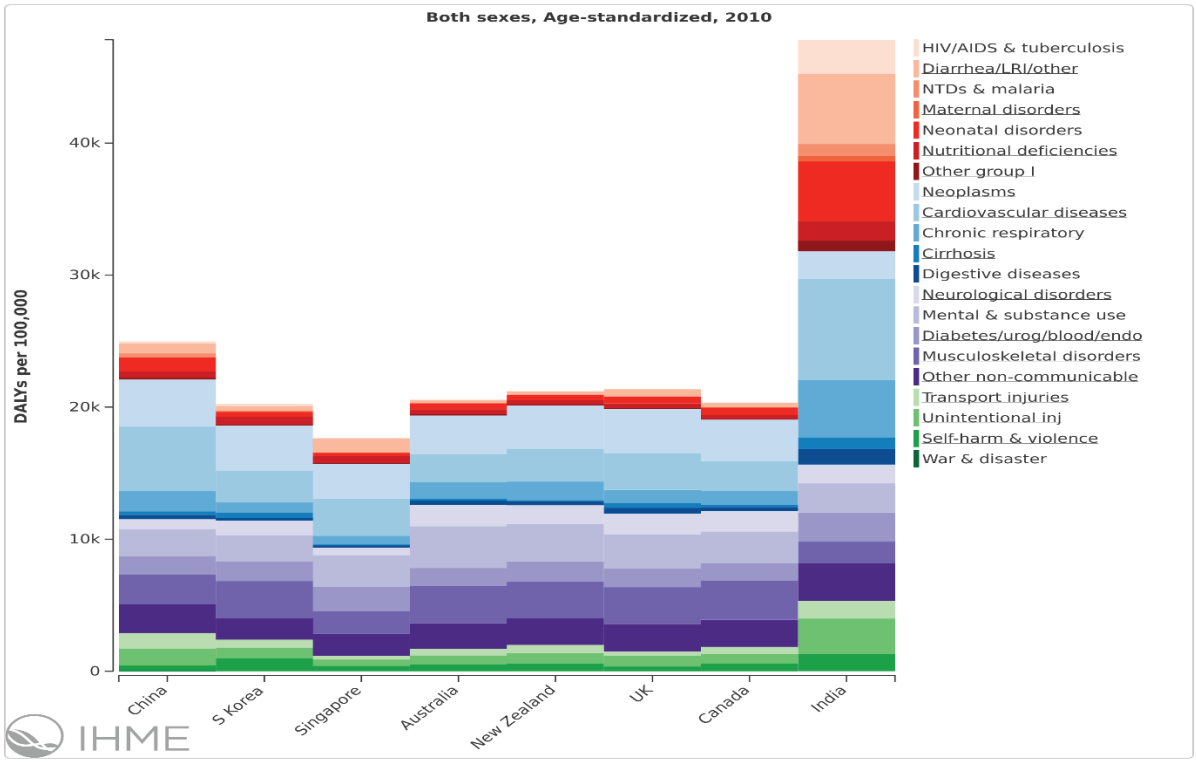


Figure 30 Age standardised DALYs, all causes, both sexes, GBD 2010

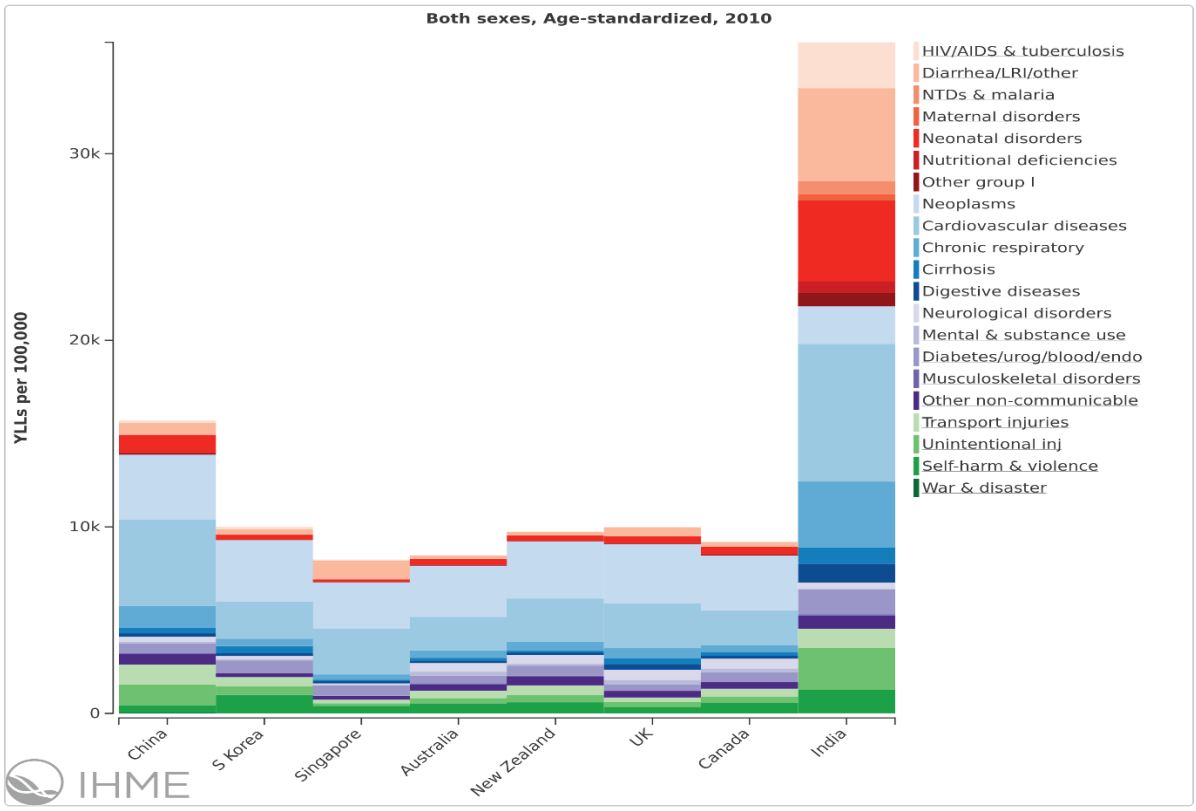


Figure 31 Age standardised YLLs, all causes, both sexes, GBD 2010

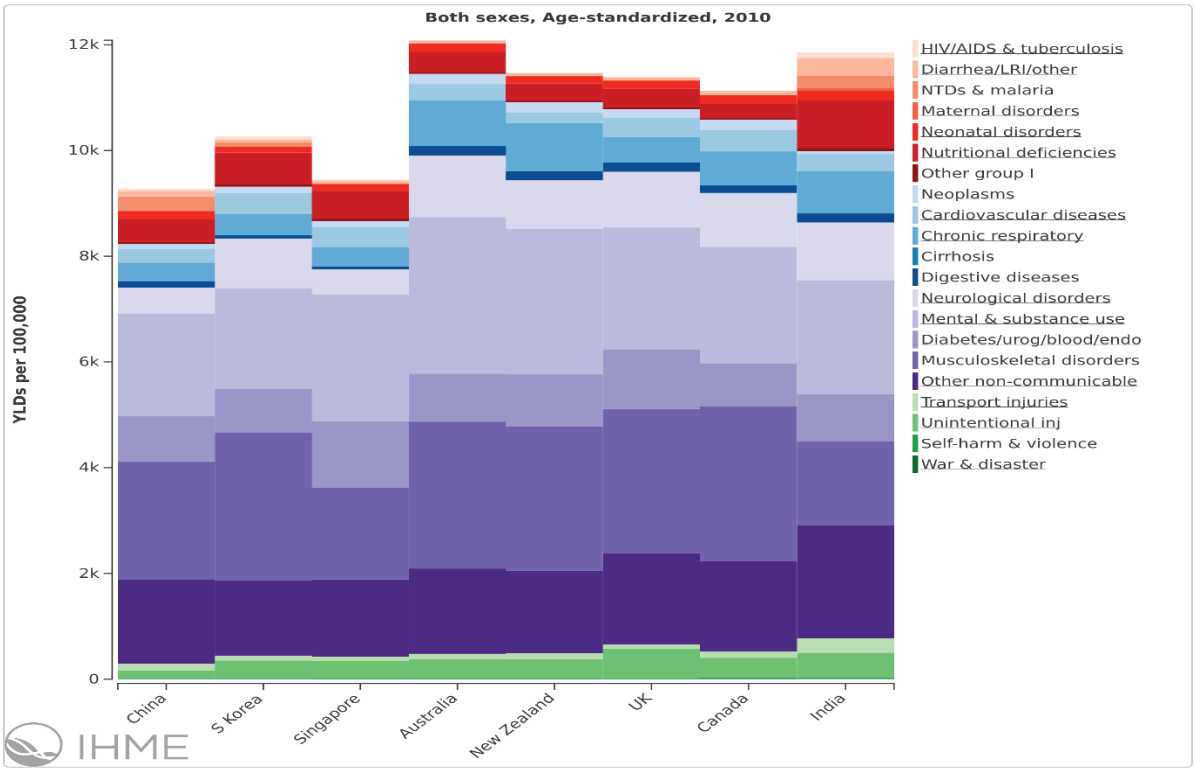


Figure 32 Age standardised YLDs, all causes, both sexes, GBD 2010

Table 27 Burden of disease and injuries, all causes, female and male combined, GBD 2010

Country	Mortality			DALYs			YLLs			YLDs		
	Rate	95% UI		Rate	95% UI		Rate	95% UI		Rate	95% UI	
Australia	473.5	470.0	476.8	20567.5	17568.2	23983.2	8481.6	8403.7	8555.7	12085.9	9029.2	15516.2
Canada	498.9	496.1	501.6	20353.1	17407.7	23541.8	9221.8	9153.1	9284.5	11131.3	8197.3	14310.9
China	742.3	713.4	774.5	24987.1	22333.9	27833.3	15708.0	15031.5	16506.4	9279.2	6889.2	12017.0
India	1308.2	1209.4	1398.4	47827.6	43766.2	52336.9	35971.8	33317.4	38535.8	11855.8	8774.4	15329.7
New Zealand	521.4	513.8	528.3	21218.7	18293.4	24584.2	9747.9	9599.1	9896.7	11470.7	8569.4	14821.3
Singapore	512.1	506.4	518.0	17693.5	15140.3	20505.6	8242.0	8114.7	8373.2	9451.5	6911.9	12329.3
South Korea	568.5	564.8	572.1	20257.9	17596.6	23256.3	9996.4	9912.6	10077.8	10261.6	7577.2	13254.3
United Kingdom	558.1	555.8	560.6	21385.6	18502.0	24653.7	9993.3	9942.5	10048.0	11392.3	8500.9	14647.9

Mortality rate and DALYs, GBD 2010 and GBD 2013

The age standardised mortality rate and DALYs of all causes have remained stable with a slight improvement particularly for India between 2010 and 2013 for all countries on the list (***Figure 33*** and ***Figure 34***). The leading conditions/causes by DALYs have also remained the same for most countries on the list over the years 2010-2013 (***Figure 35*** to ***Figure 38***). The top 11 causes for DALYs have been the same for all countries. This stability affirms the use of GBD 2010 for comparison purposes.

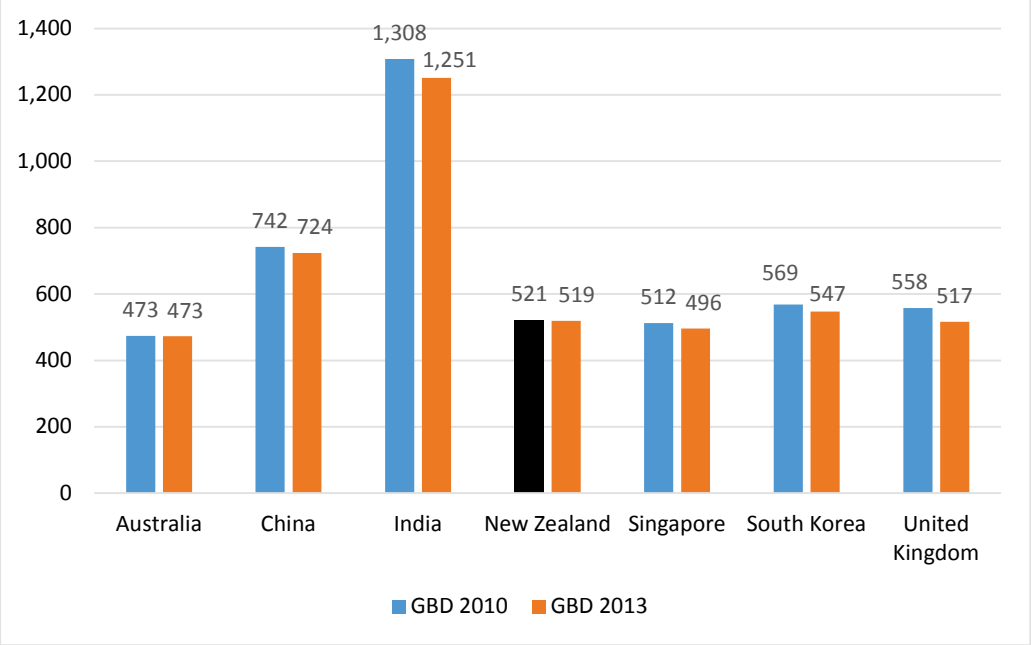


Figure 33 Age standardised mortality rate, all causes, both sexes, GBD 2010 and GBD 2013

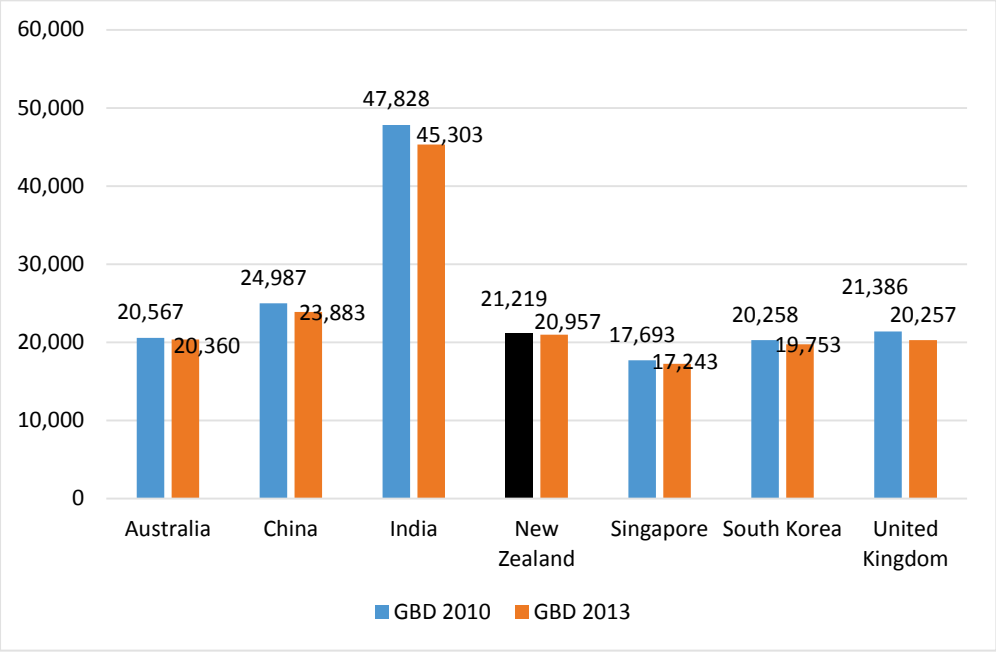


Figure 34 Age standardised DALYs, all causes, both sexes, GBD 2010 and GBD 2013

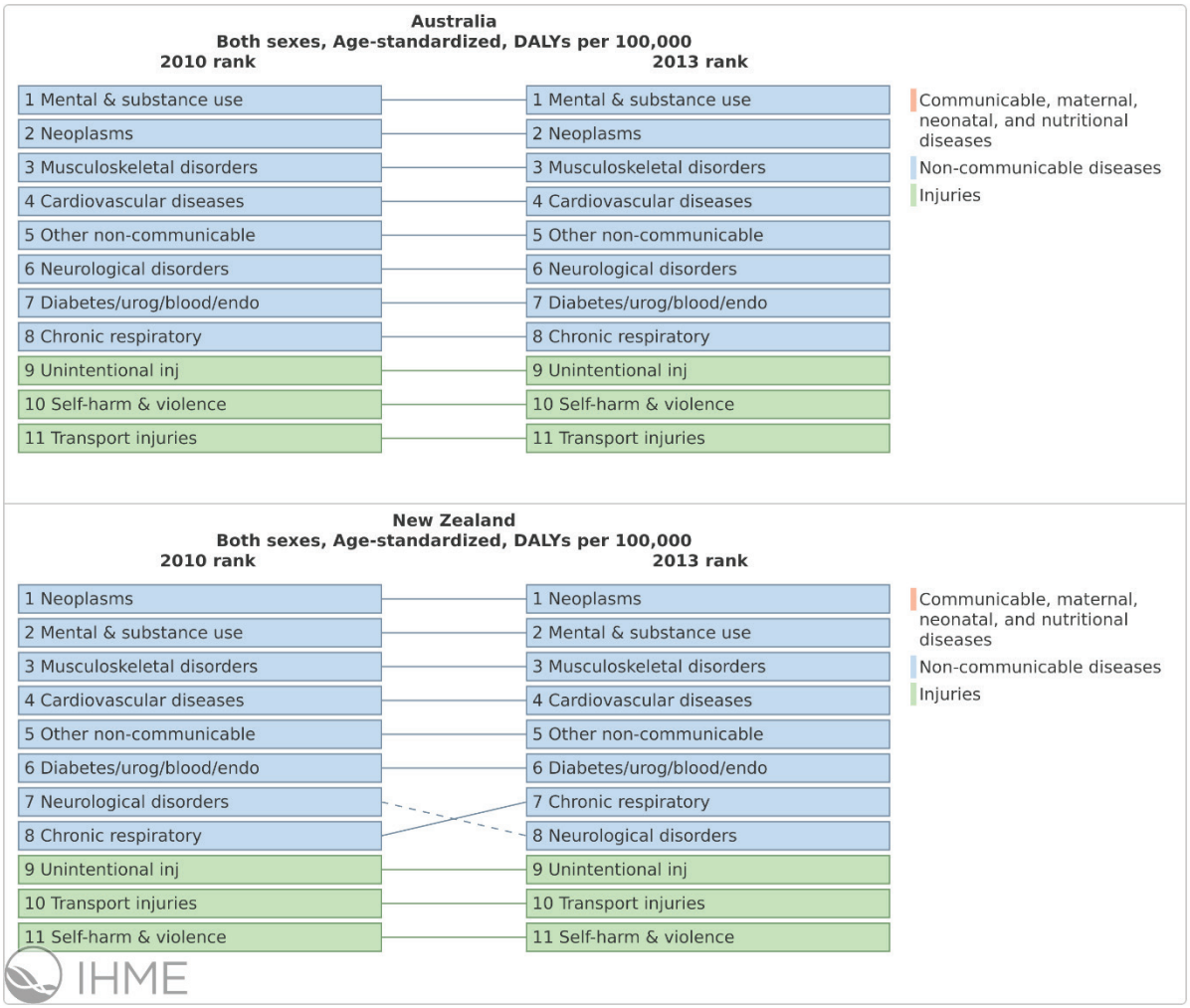


Figure 35 Age standardised DALYs, Australia and New Zealand, both sexes, GBD 2010-GBD 2013

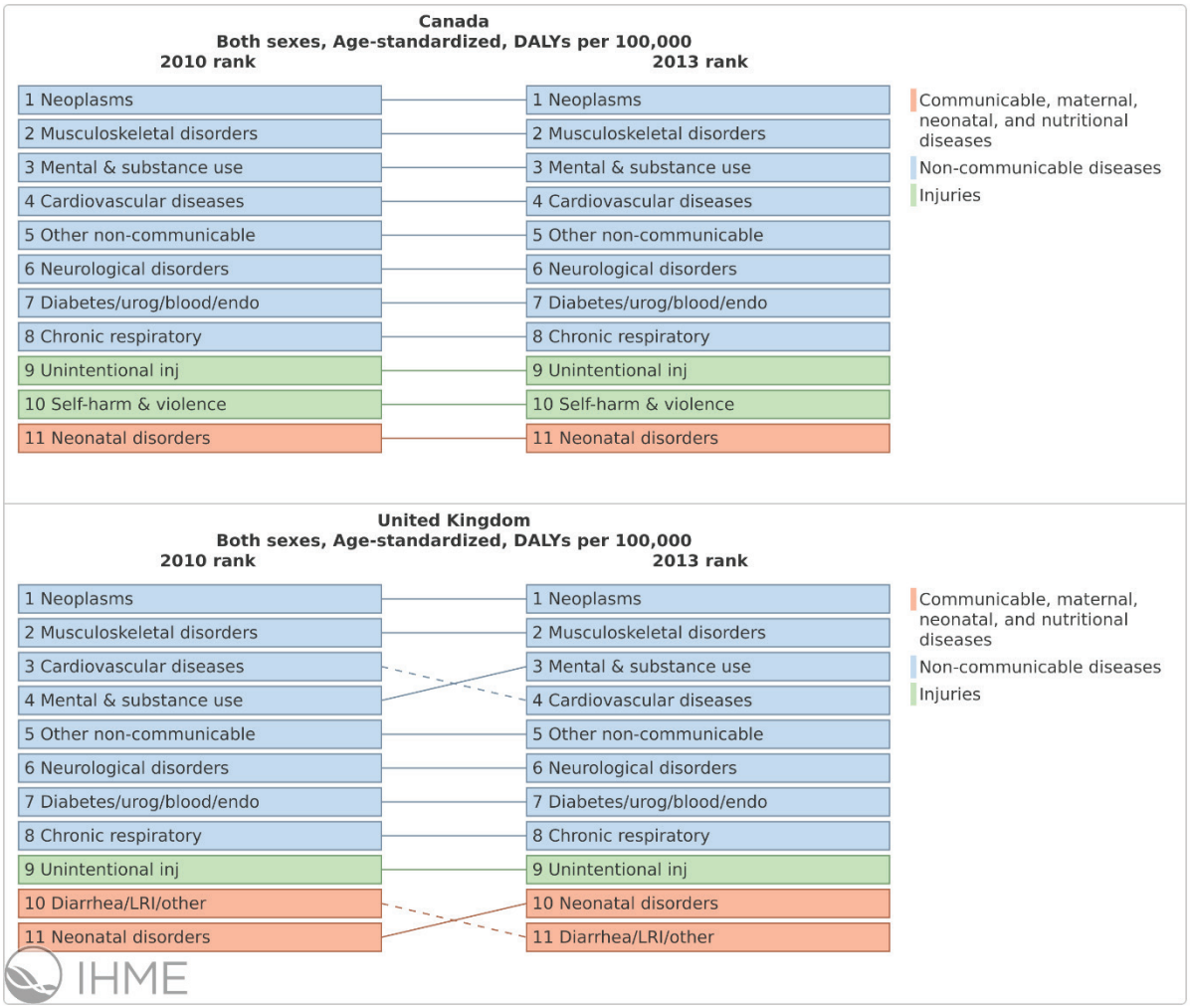


Figure 36 Age standardised DALYs, Canada and the UK, both sexes, GBD 2010-GBD 2013

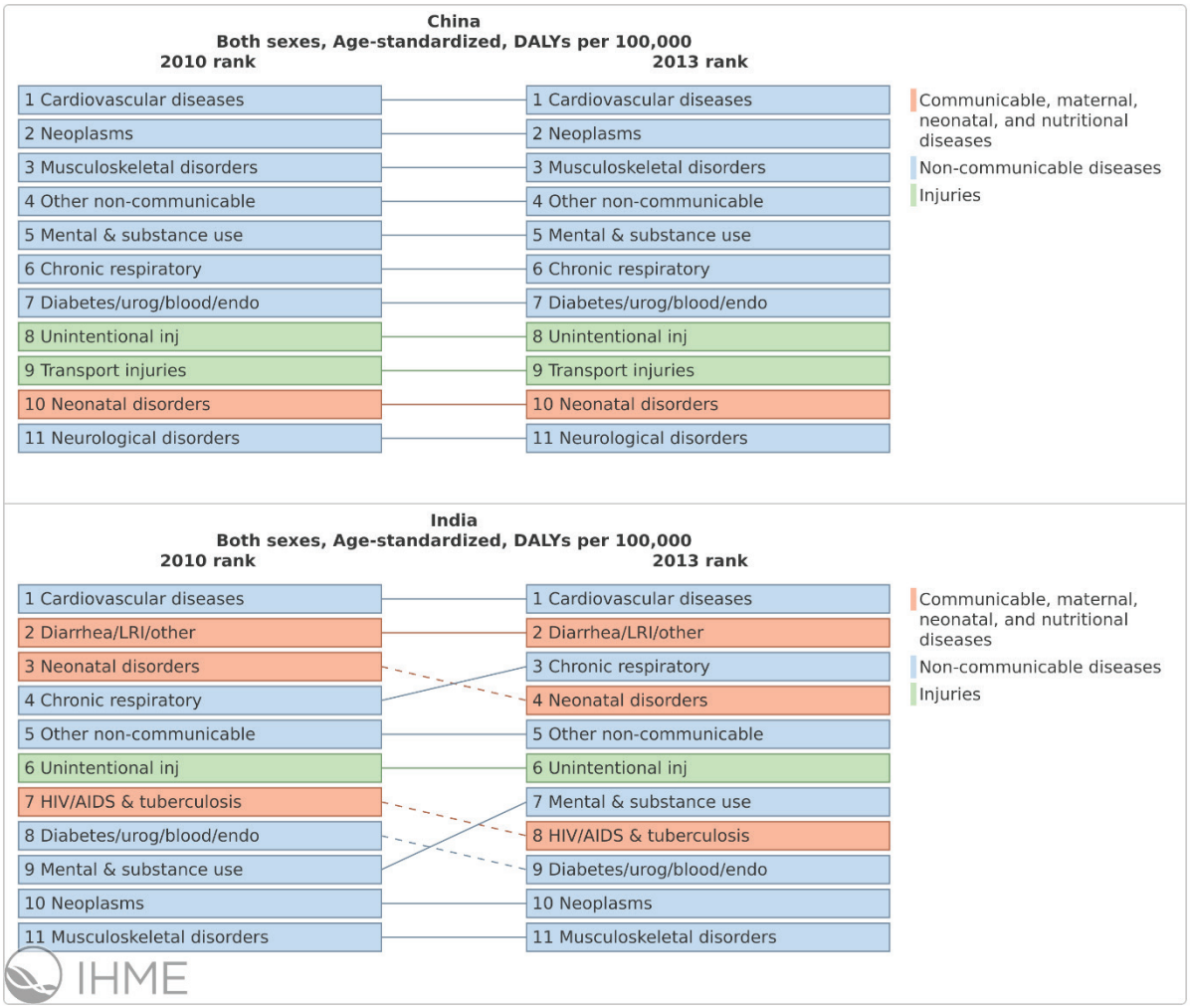


Figure 37 Age standardised DALYs, China and India, both sexes, GBD 2010-GBD 2013

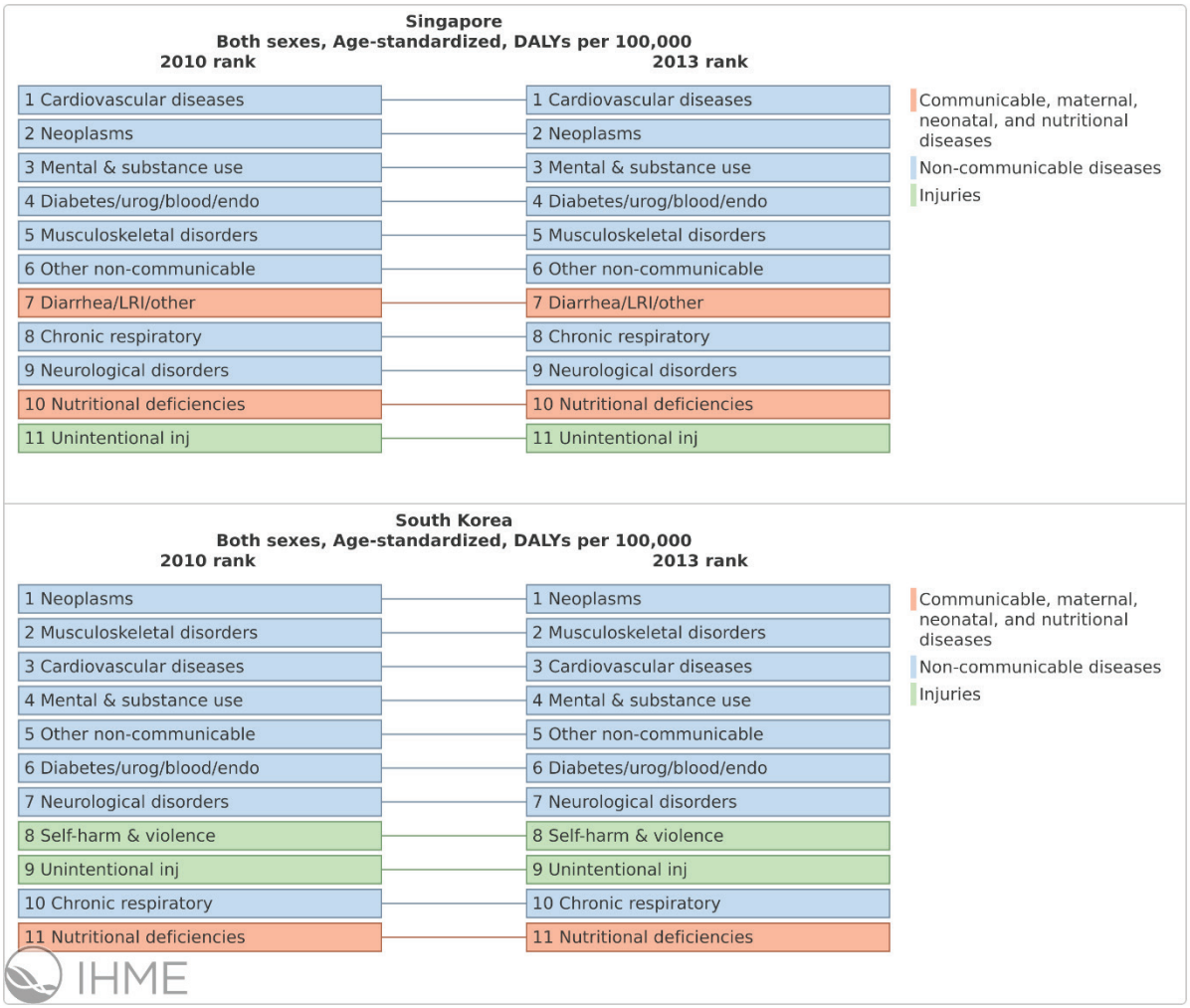


Figure 38 Age standardised DALYs, Singapore and Republic of Korea, both sexes, GBD 2010-GBD 2013

Leading causes of disease burden by country, GBD 2010

The ranking by the leading causes (top 21) is shown in

Figure 39 - ***Figure 42*** in the order of DALYs, mortality, YLLs and YLDs. Cardiovascular diseases and neoplasms were the top two causes of disease burden measured by DALYs in most countries, but mental and substance use was ranked the first in Australia and second in New Zealand, while musculoskeletal disorders ranked the second place for the UK and Canada. India had 'diarrhoea, lower respiratory and other common infectious diseases' ranked second, which is quite different as compared from all other countries reflecting that the burden of communicable diseases is highly prevalent across this population.

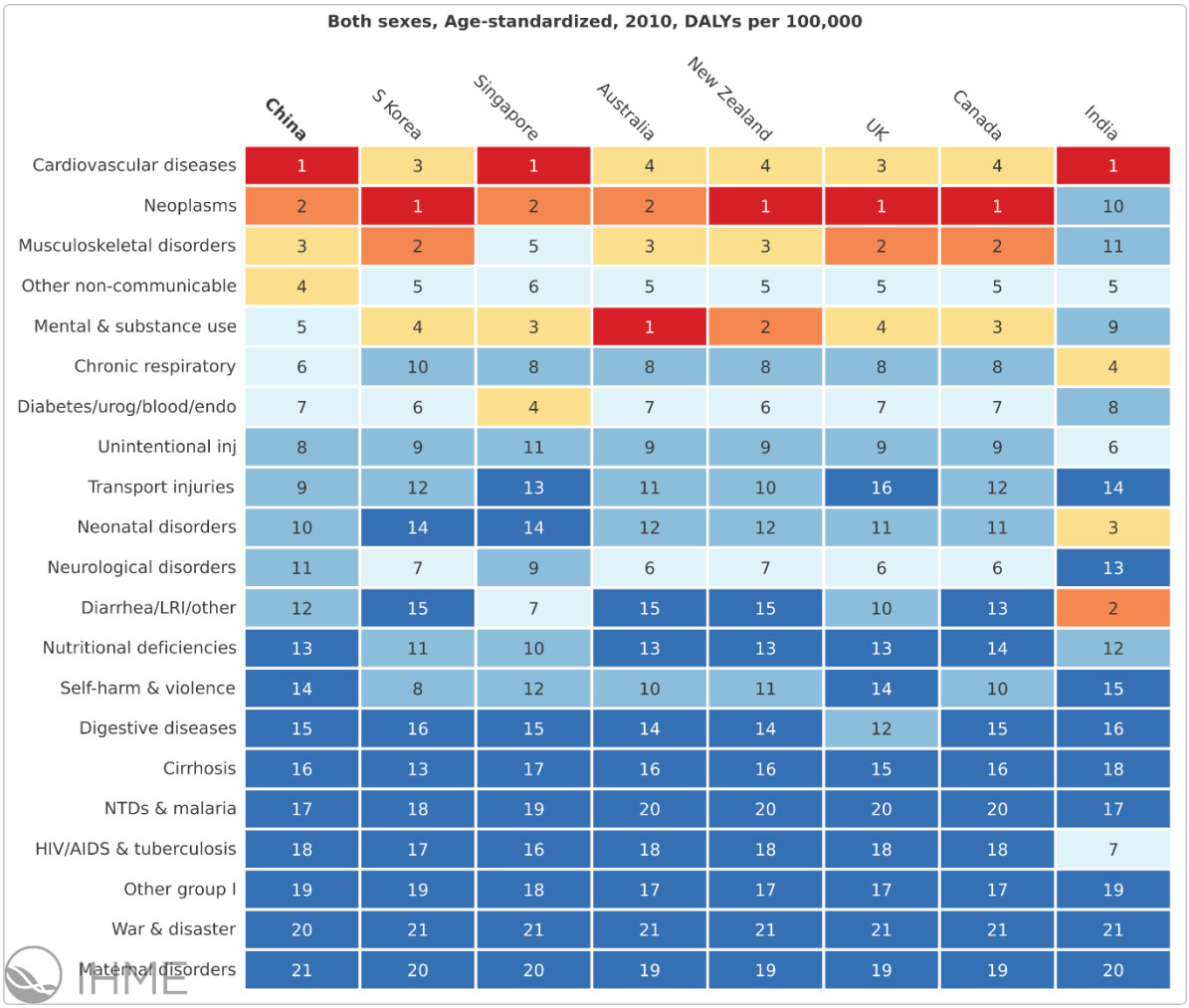


Figure 39 Rank of causes by age standardised DALYs, all countries, both sexes, GBD 2010

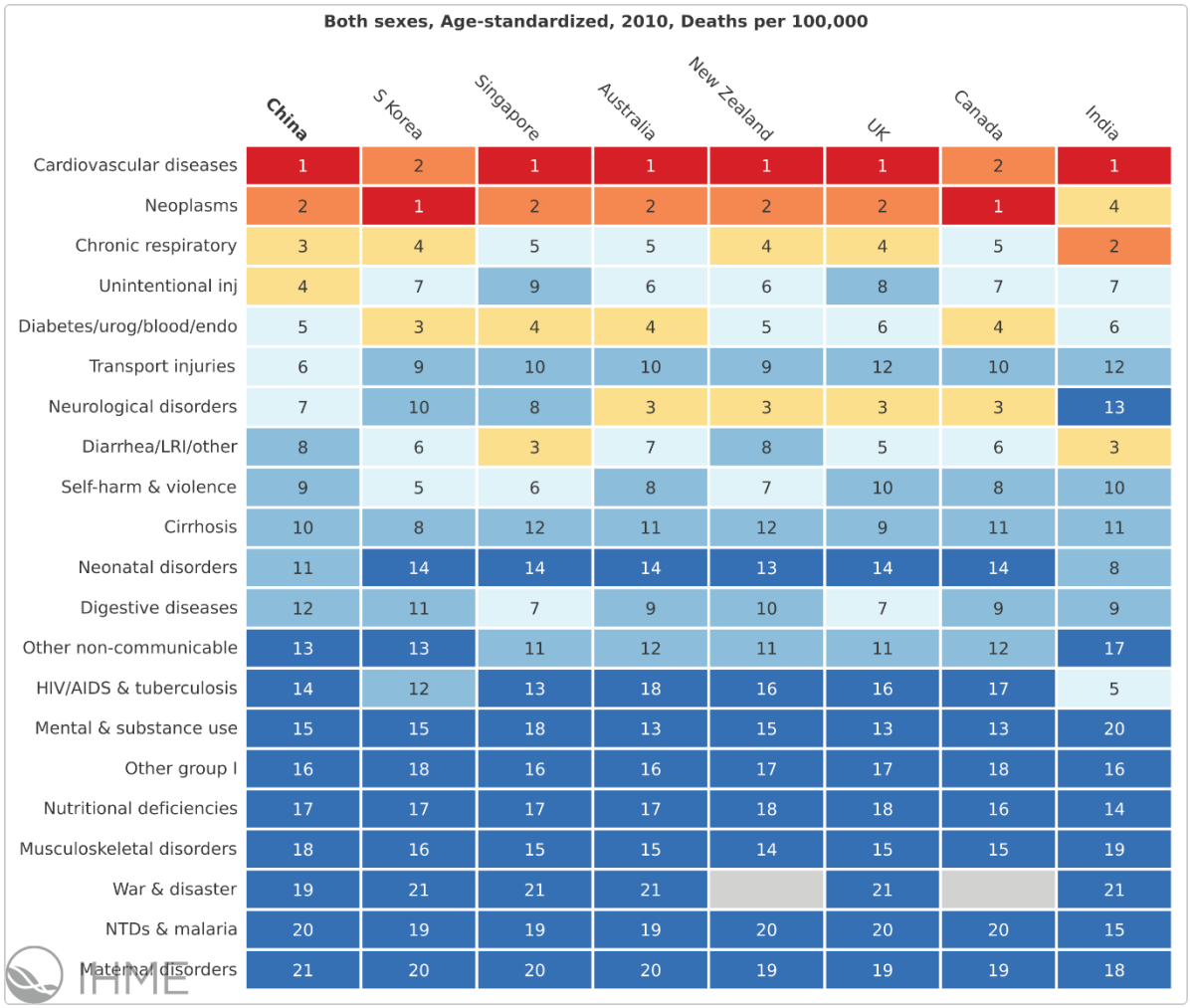


Figure 40 Rank of causes by age standardised mortality rate, all countries, both sexes, GBD 2010

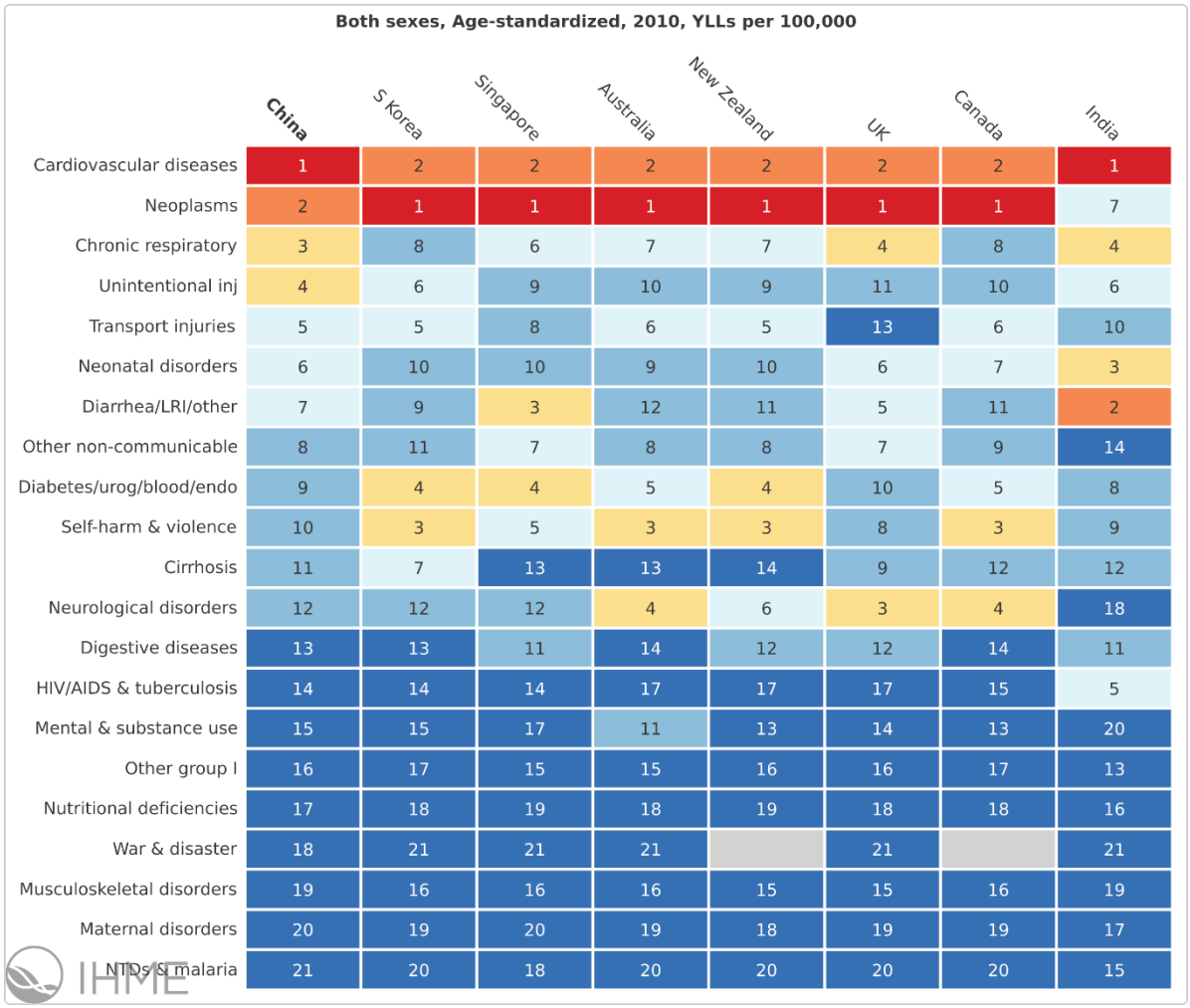


Figure 41 Rank of causes by age standardised YLLs, all countries, both sexes, GBD 2010

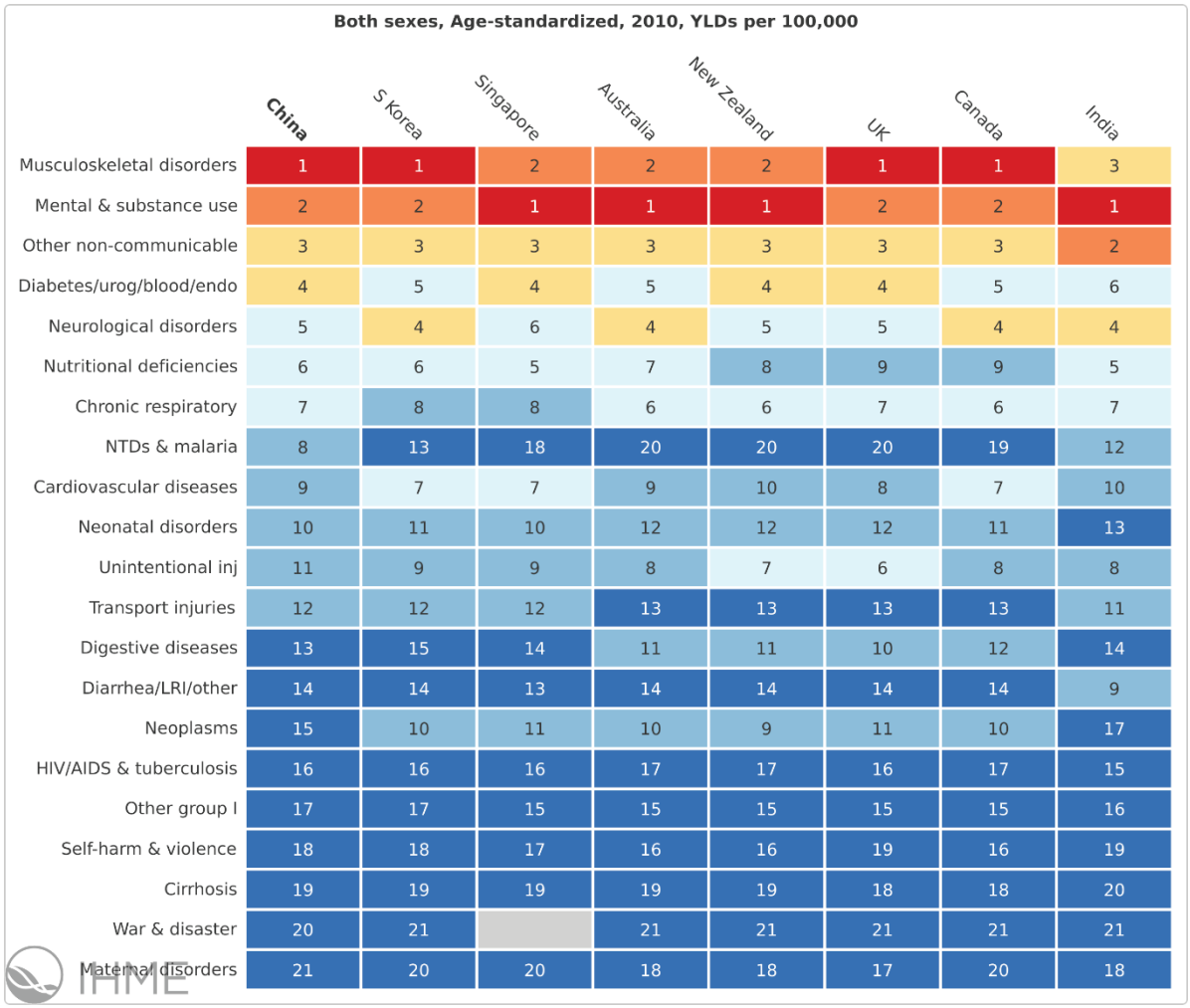


Figure 42 Rank of causes by age standardised YLDs, all countries, both sexes, GBD 2010

Variations within a country

There were also internal variations within a country, e.g. China and the UK. The variations within China are much larger than that in the UK. The age standardised DALYs for Shanghai was 15,878 per 100,000 for females (95% uncertainty level: 11,998, 20,446) and 19,242 per 100,000 for males (95%UI: 15,196, 24,235), while the rates in Tibet doubled that in Shanghai: 33,874 per 100,000 for women (95% uncertainty level: 27,342, 41,605) and 39,925 per 100,000 for men (95% uncertainty level: 33,242, 47,716). The lowest age standardised DALYs was for people in England and the highest was in Scotland, but the rate ratio of age standardised DALYs was between 1.14 and 1.18 (Scottish were 14%-18% higher in DALY rate).

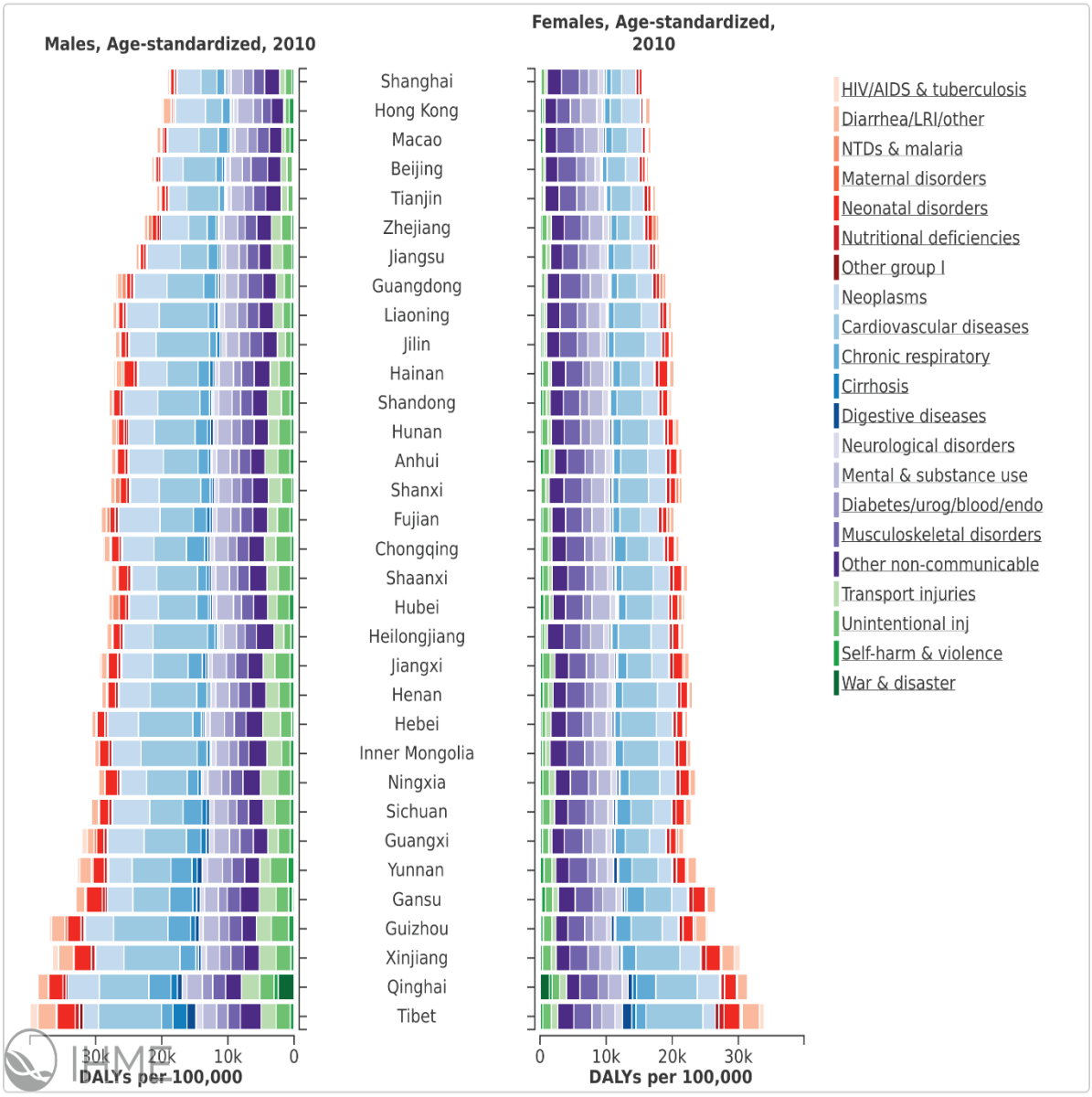


Figure 43 Variation of DALYs within China by sex, GBD 2010

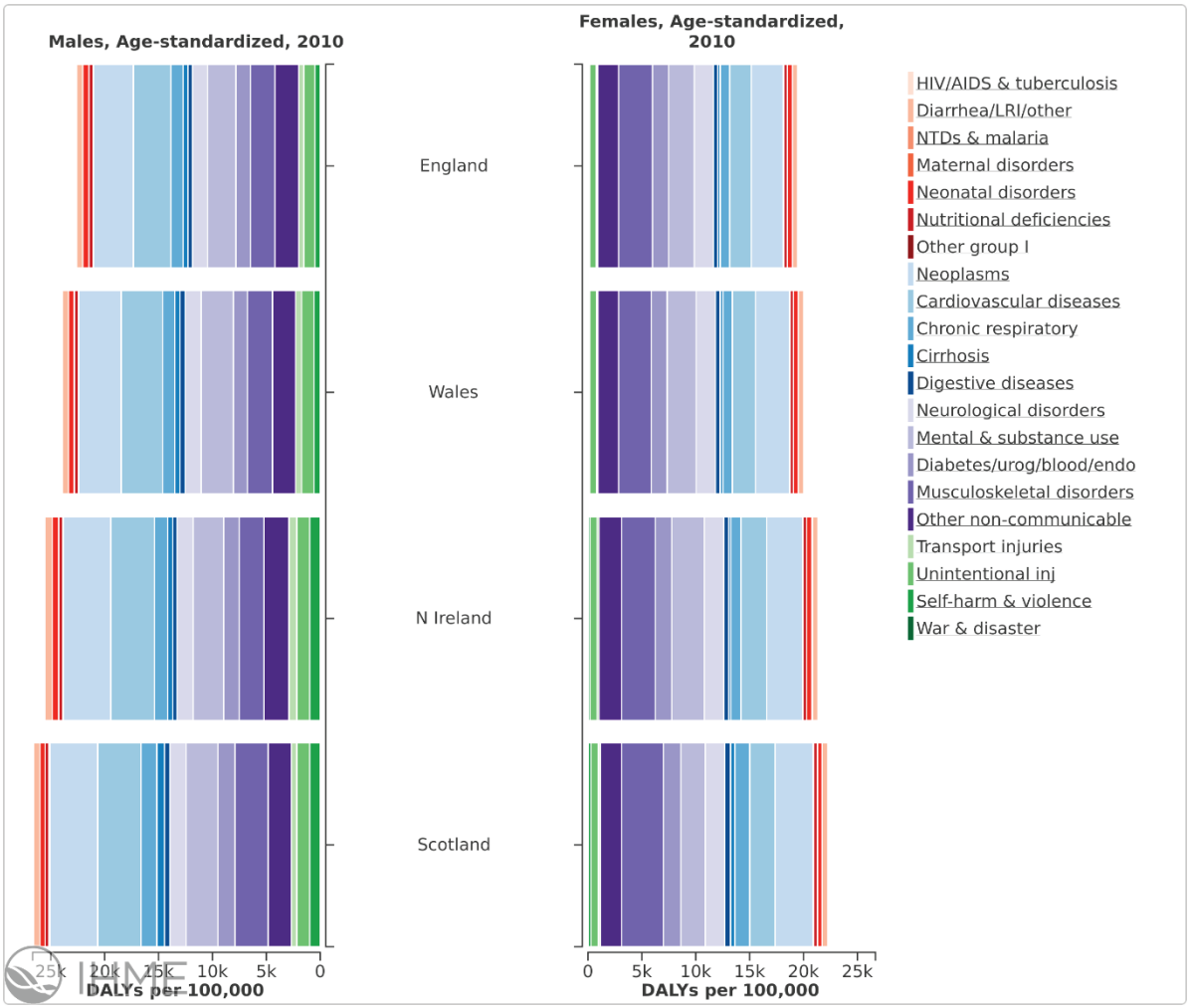


Figure 44 Variation of DALYs within the UK by sex, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

DALYs and YLDs are not included in the comparison/ranking at DHB level due to fact that the necessary epidemiological data were not available for Asians and their sub-groups in both DHBs and the potentially large discrepancy between data sources. Only age standardised mortality rates and YLLs are presented.

The Asians in Waitemata DHB had roughly half of the mortality rate of all the residents of New Zealand (rate ratio: 53% for women and 47% for men) using the data in **Table 29**. If these rate ratios can be applied to the GBD 2010 mortality rates, we would have 236 deaths per 100,000 for women and 288 per 100,000 for men. These rates are clearly the lowest of all the countries on the list, even when uncertainty or confidence level is taken into account. There were variations within Asian sub-groups; for women, the mortality rates were relatively close to each other between Chinese and Other Asians but better than that of Indian; for men, Chinese had clearly a lower rate than that of the other two sub-groups.

In Auckland DHB, the rate ratios were 61% for women and 56% for men relative to the rate for all New Zealand residents. Again, if we apply these ratios to the New Zealand rate in GBD 2010, we will

have 273 deaths per 100,000 for females and 342 per 100,000 for males. Similar to the Asians in Waitemata DHB, these rates are also the lowest at country level. As for Asian sub-groups, Chinese women were leading followed by Indian and then Other Asian women; for men, Chinese also had the lowest mortality rate but the difference between Indian and Other Asian men was not statistically significant.

Table 28 Age standardised mortality rate, all causes, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	393.8	389.7	398.2	564.4	559.8	569.3
Canada	420.4	416.7	424.2	592.5	587.8	596.9
China	600.3	576.6	629.4	902.6	851.1	955.9
India	1156.3	1030.5	1266	1473.9	1298.4	1661.9
New Zealand	**446.8**	**436.6**	**455.9**	**608.2**	**597.6**	**618.4**
Singapore	428.8	421	437.5	613.8	604.8	622.8
Republic of Korea	446.6	442.7	450.3	732.3	725.7	738.8
United Kingdom	477.8	474.3	481	653.9	650.2	657.4

Table 29 Age standardised mortality rate, all causes, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**346.8**	**346.2**	**347.5**	**480.6**	**479.8**	**481.5**
Waitemata Asian	183.4	179.8	187.0	227.2	222.7	231.8
Waitemata European/Other	280.3	278.4	282.3	379.5	377.1	381.9
Auckland Asian	212.2	208.7	215.6	270.1	265.7	274.4
Auckland European/Other	305.7	303.3	308.1	428.5	425.4	431.5

Table 30 Age standardised mortality rate, all causes, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	179.6	174.6	184.5	164.9	159.5	170.3
	Indian	213.6	204.4	222.8	239.0	228.2	249.7
	Other Asian	176.6	170.1	183.1	360.2	348.8	371.6
Auckland	Chinese	199.6	194.5	204.7	233.8	227.7	239.8
	Indian	223.9	217.5	230.3	314.7	307.1	322.4
	Other Asian	249.3	240.5	258.2	298.4	285.8	311.0

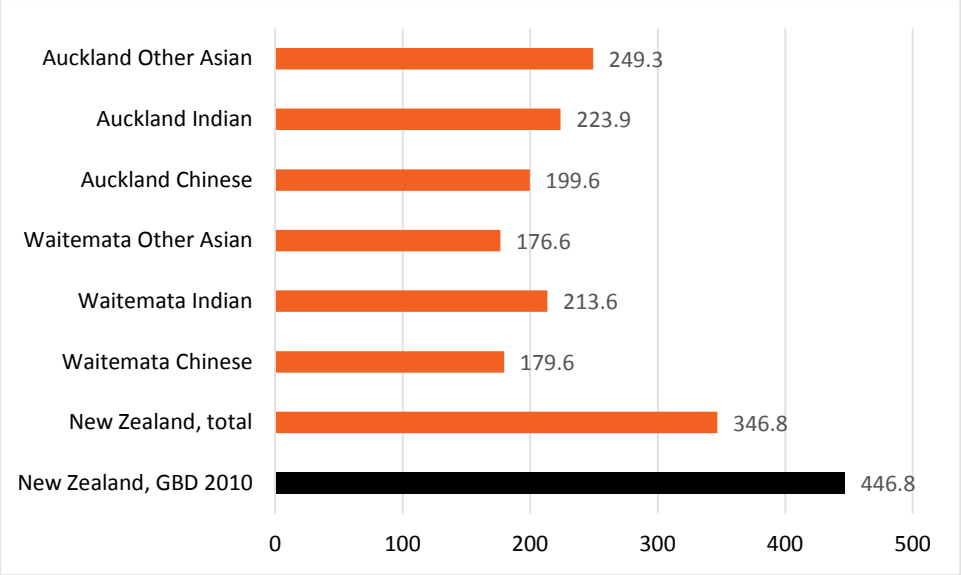


Figure 45 Age standardised mortality rate, New Zealand and Asian-subgroups in Waitemata and Auckland DHBs, female

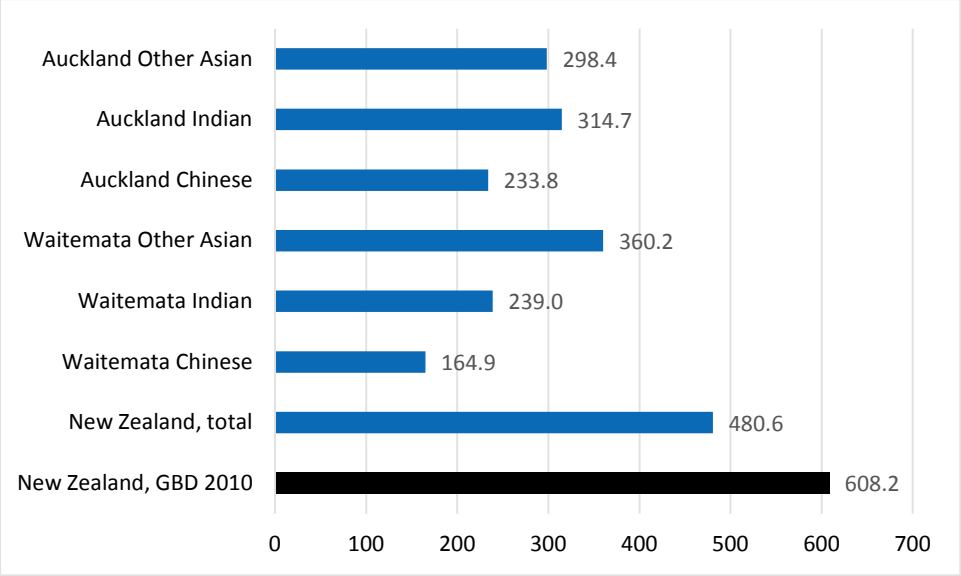


Figure 46 Age standardised mortality rate, New Zealand and Asian-subgroups in Waitemata and Auckland DHBs, male

The Asians in Waitemata DHB had roughly 40% of the YLL rate of all the residents of New Zealand (rate ratio: 41% for women and 40% for men) using the data in **Table 32**. If these rate ratios can be applied to the GBD 2010 rates, we would have 3,188 years of life lost per 100,000 for women and 4,735 per 100,000 for men. Similar to the findings of the aforementioned mortality rate, these rates are also clearly the lowest of all the countries on the list, even when uncertainty level or confidence level is taken into account. There were variations within Asian sub-groups; for women, Chinese were leading followed by Other Asian and then Indian; for men, India was in the middle following Chinese.

In Auckland DHB, the rate ratios were 52% for women and 50% for men relative to the rate for all New Zealand residents. Again, if we apply these ratios to the New Zealand rate in GBD 2010, we will have 4,096 YLLs per 100,000 for females and 5,921 per 100, 000 for males. Just like the Asians in

Waitemata DHB, these rates are also the lowest at country level. As for Asian sub-groups, Chinese women were leading followed by Indian and then Other Asian women with almost equal rates; for men, Chinese had the lowest mortality rate then Indian and Other Asian men.

Table 31 Age standardised YLLs, all causes, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	6486.3	6386	6594.7	10603.6	10482.9	10729.7
Canada	7268.7	7161.1	7370.5	11352	11223.8	11471.1
China	11795.4	11167.5	12503.7	19775.1	18523.6	20997.5
India	31937.2	28896.0	34975.2	40055.9	35687.8	44841.0
New Zealand	**7832.9**	**7637**	**8027.0**	**11833.7**	**11589.0**	**12076.1**
Singapore	6338.8	6187.1	6508.0	10386.5	10188.4	10589.8
Republic of Korea	6917.4	6821.9	7023.8	13625.2	13465.0	13771.9
United Kingdom	7986.5	7905.0	8073.5	12196.5	12098.3	12293.7

Table 32 Age standardised YLLs, all causes, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**8467.1**	**8462.5**	**8471.8**	**12584.0**	**12578.1**	**12589.8**
Waitemata Asian	3446.4	3427.9	3465.0	5035.2	5011.2	5059.2
Waitemata European/Other	6344.9	6331.1	6358.7	9128.5	9111.5	9145.4
Auckland Asian	4427.3	4405.5	4449.1	6296.6	6269.9	6323.3
Auckland European/Other	6420.5	6404.5	6436.5	9808.7	9788.2	9829.2

Table 33 Age standardised YLLs, all causes, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	3225.7	3201.0	3250.5	3556.9	3526.8	3587.1
	Indian	3919.3	3873.3	3965.2	5439.9	5387.2	5492.5
	Other Asian	3419.1	3386.5	3451.6	7610.7	7554.7	7666.8
Auckland	Chinese	4380.4	4344.7	4416.1	5436.2	5394.4	5478.0
	Indian	4627.3	4588.5	4666.0	6341.6	6301.4	6381.7
	Other Asian	4662.2	4617.0	4707.4	8127.9	8057.6	8198.2

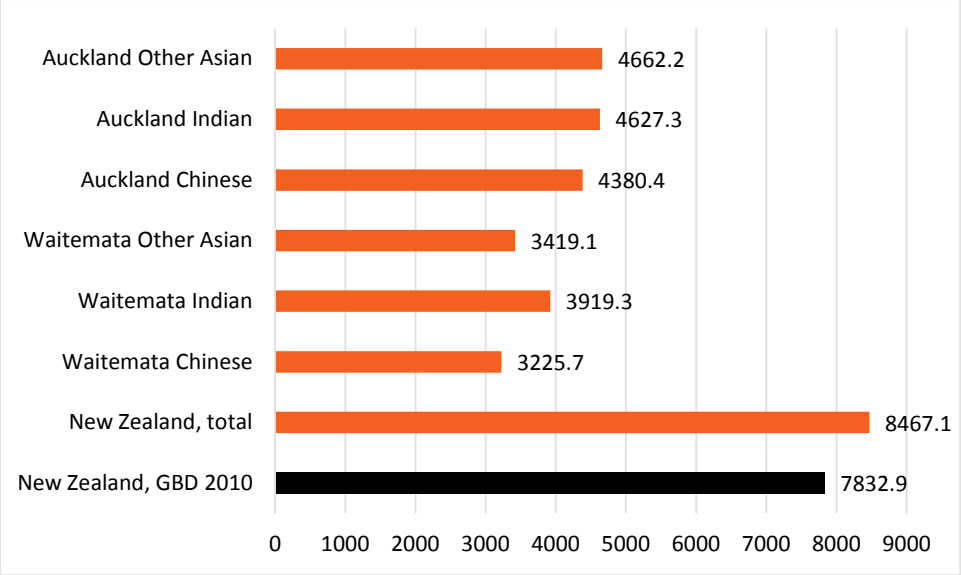


Figure 47 Age standardised YLLs, New Zealand and Asian-subgroups in Waitemata and Auckland DHBs, female

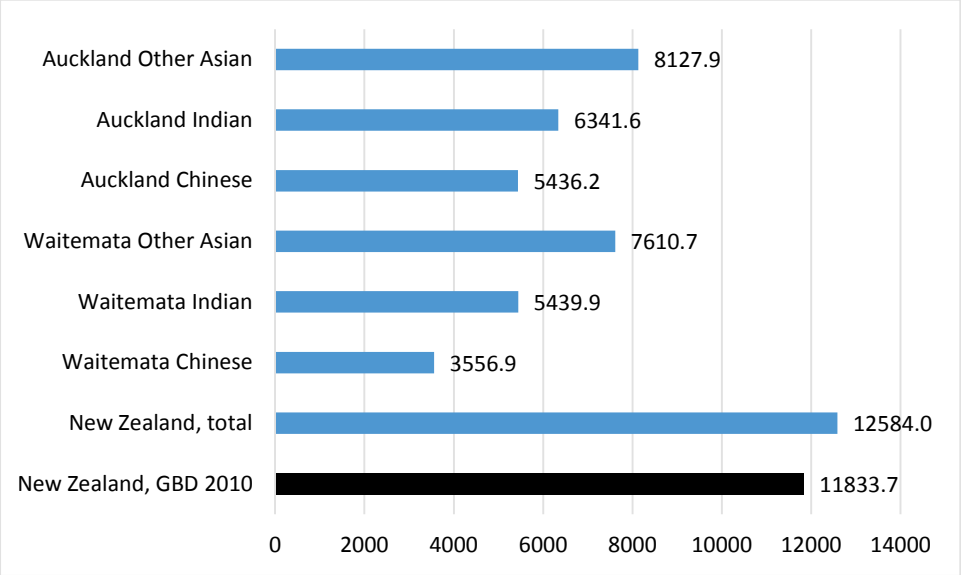


Figure 48 Age standardised YLLs, New Zealand and Asian-subgroups in Waitemata and Auckland DHBs, male

Non-communicable diseases

In this section, cardiovascular diseases, neoplasms, diabetes mellitus and Alzheimer's disease and other dementias are included for benchmarking.

Cardiovascular diseases

Burden of cardiovascular diseases at country level, GBD 2010

Age standardised rate of mortality, DALYs, YLLs and YLDs are presented for both sexes at country level. In terms of mortality rates, Australia and Canada did better than New Zealand which had a similar rate to the UK and Singapore. India and China are outliers with higher cardiovascular mortality rates. New Zealand ranked fourth in DALY rates, better than the UK and Singapore and much better than India and China. For YLL rate, New Zealand was in the same place as for DALYs. The distribution of YLD rates by country shows a very different picture from that of mortality rate or DALYs. New Zealand had the lowest cardiovascular YLD rate followed by China, Australia and India. Rheumatic heart disease shared a good proportion of the non-fatal health loss due to cardiovascular disease in India (44 YLDs per 100,000; 95%UI: 30, 62), which was very different from other countries.

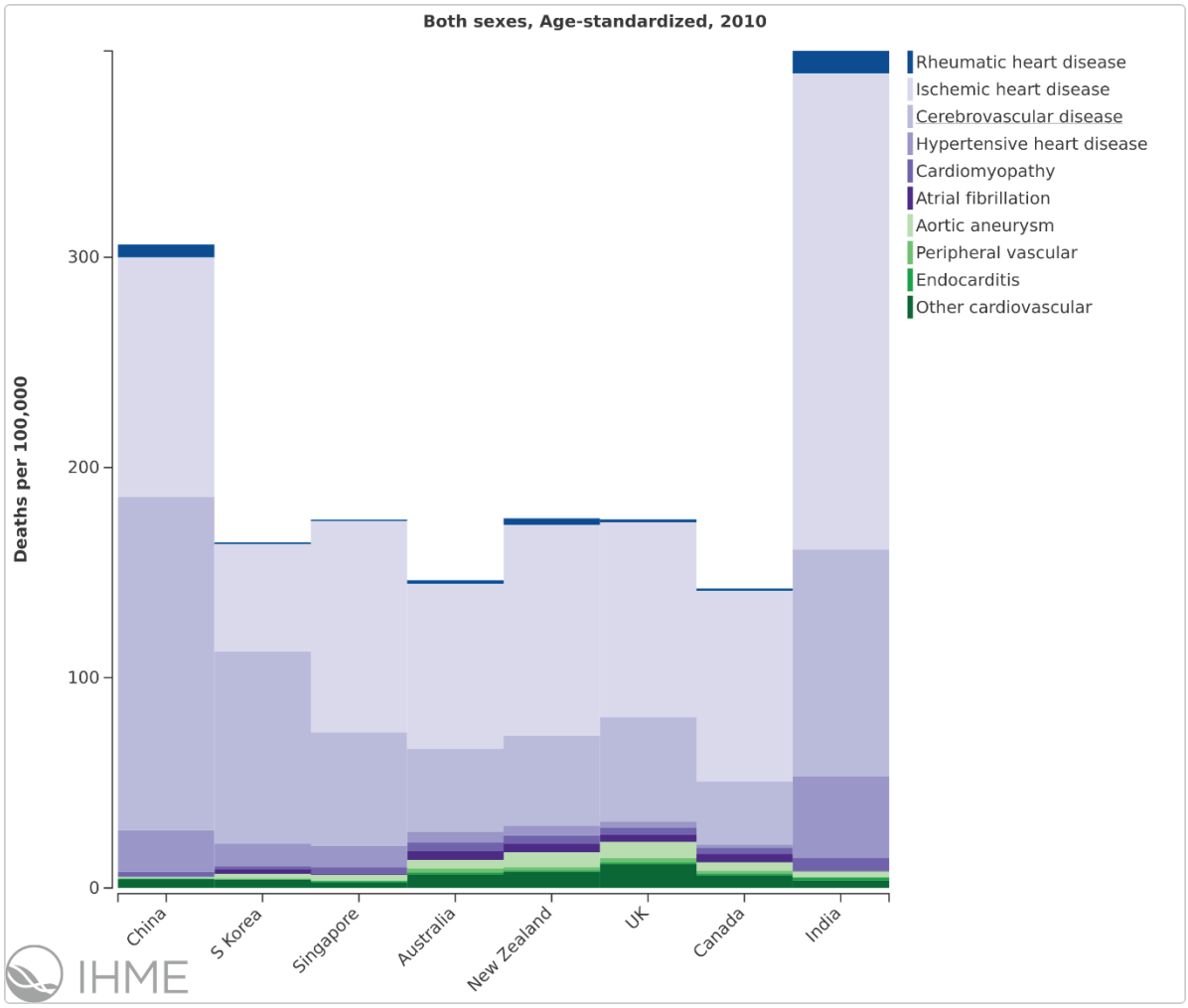


Figure 49 Age standardised mortality rate for cardiovascular diseases, both sexes, GBD 2010

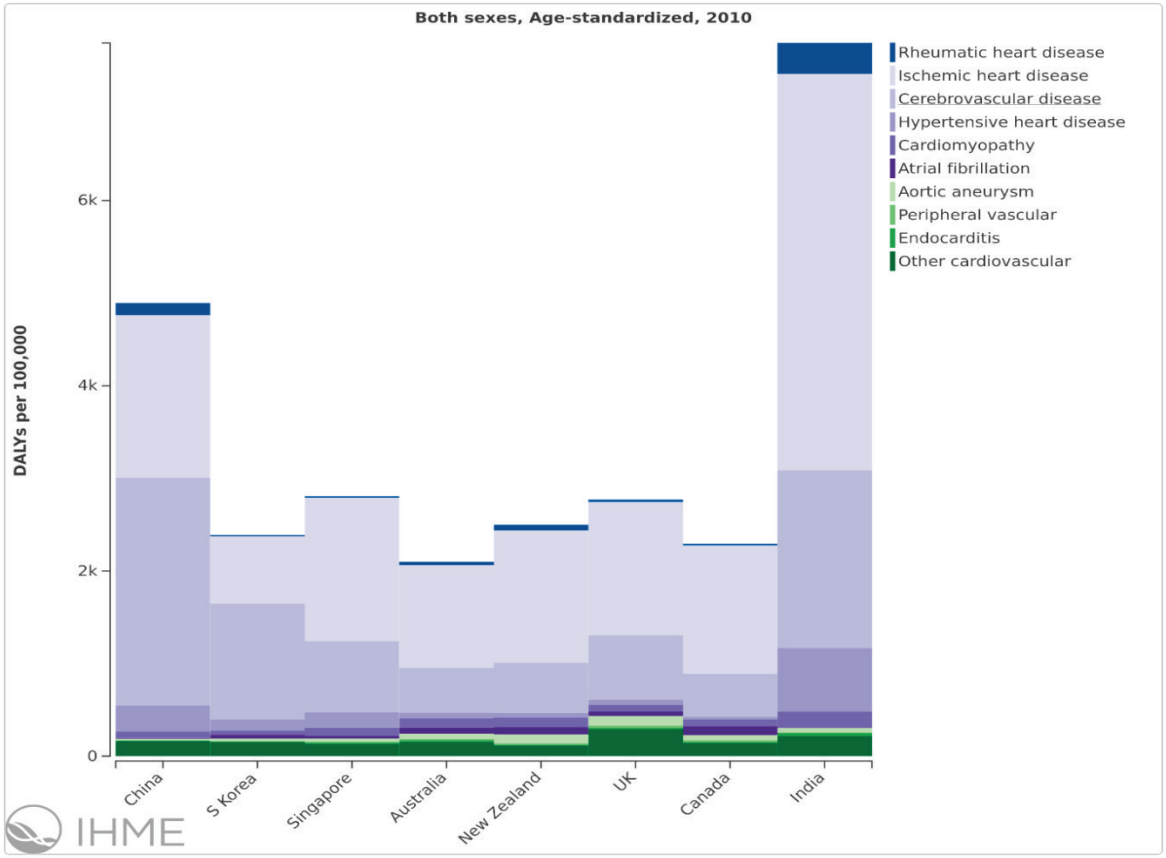


Figure 50 Age standardised DALYs for cardiovascular diseases, both sexes, GBD 2010

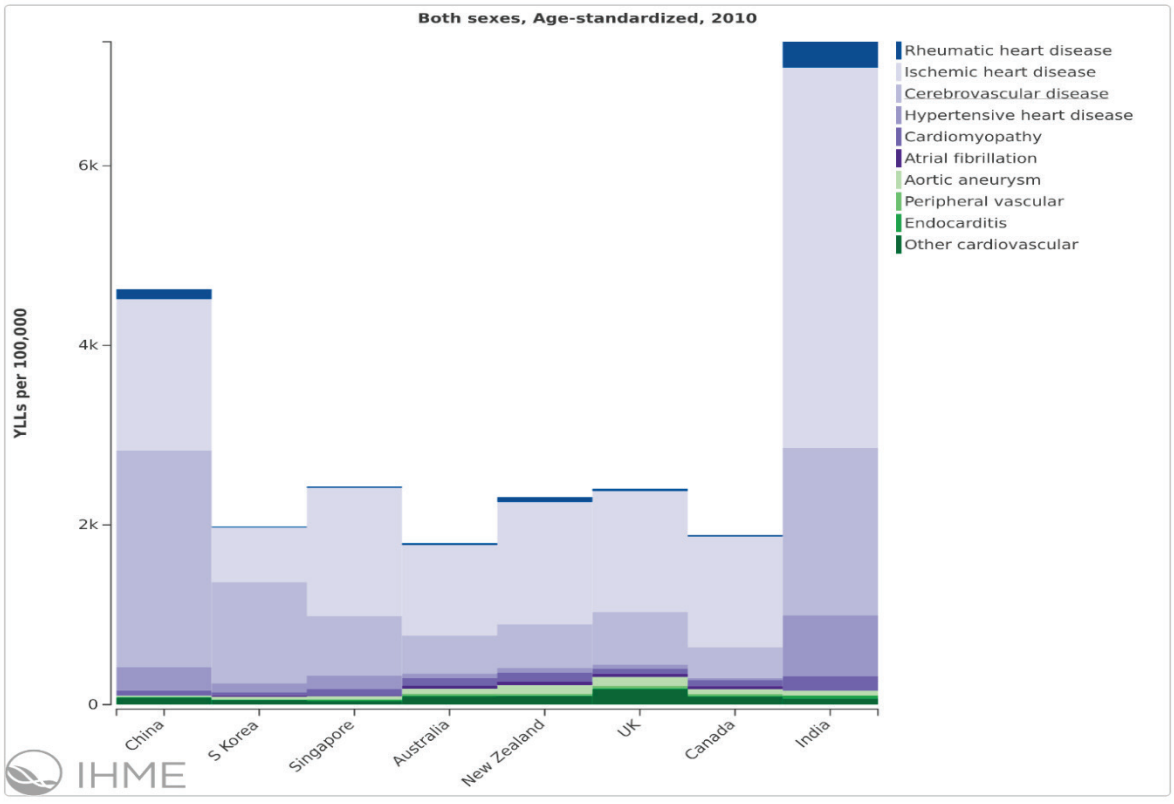


Figure 51 Age standardised YLLs for cardiovascular diseases, both sexes, GBD 2010

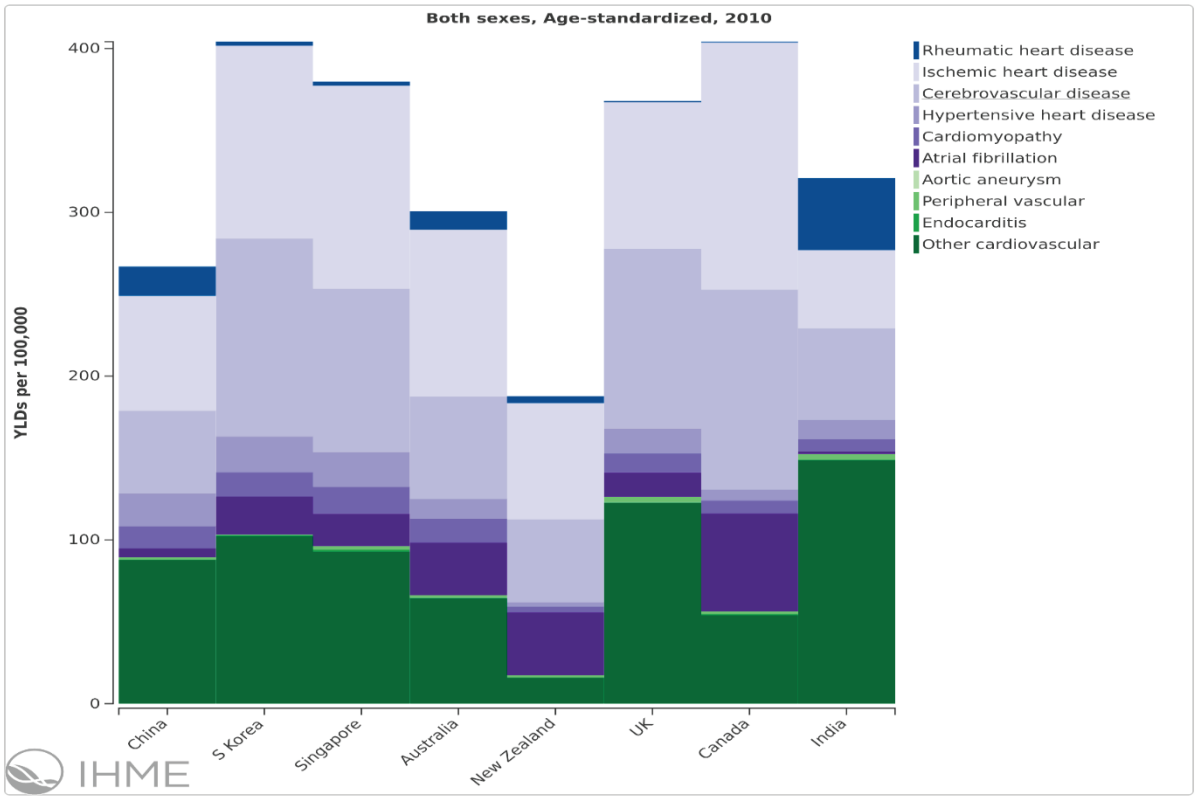


Figure 52 Age standardised YLDs for cardiovascular diseases, both sexes, GBD 2010

The Republic of Korea and Australia had lower rates of mortality and DALYs than New Zealand, which did slightly better than China and much better than India (**Table 34**). New Zealand had a relatively lower rate of mortality and DALYs for cerebrovascular disease after Australia and Canada, whereas the two middle income countries China and India had the worst rates (rate ratio of mortality: 3.7 for China and 2.5 for India; rate ratio of DALYs: 4.6 for China and 3.6 for India) (**Table 35**).

Table 34 Age standardised mortality and DALYs for Ischemic heart disease, both sexes, GBD 2010

Country	Mortality			DALYs		
	Rate	95% UI		Rate	95% UI	
Australia	78.7	71.9	96.1	1,109.7	1,019.5	1,314.9
Canada	90.7	82.9	107.6	1,383.4	1,280.4	1,582.4
China	114.0	88.4	124.5	1,755.4	1,389.5	1,932.4
India	226.5	191.4	255.6	4,278.4	3,632.3	4,915.8
New Zealand	**100.4**	**93.2**	**112.5**	**1,430.5**	**1,332.6**	**1,610.3**
Singapore	100.7	82.6	110.9	1,550.5	1,351.1	1,677.6
South Korea	51.2	43.2	61.2	727.4	645.0	864.1
United Kingdom	92.7	86.9	108.9	1,437.2	1,352.4	1,651.8

Table 35 Age standardised mortality and DALYs for cerebrovascular disease, both sexes, GBD 2010

Country	Mortality			DALYs		
	Rate	95% UI		Rate	95% UI	
Australia	39.3	33.1	46.9	485.2	410.5	554.6
Canada	29.9	24.3	35.0	467.1	393.4	538.4
China	158.4	146.5	176.4	2,460.3	2,274.1	2,756.6
India	107.9	91.3	124.3	1,924.6	1,602.7	2,237.4
New Zealand	42.8	35.9	48.5	538.9	459.4	600.6
Singapore	54.0	46.2	67.3	764.3	673.9	908.1
South Korea	91.5	83.7	110.4	1,248.2	1,142.7	1,481.2
United Kingdom	49.7	44.4	59.1	696.7	622.7	794.1

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

Australia and Canada had lower mortality rates than New Zealand although it was not statistically significant for women. India and China had the highest rates for women and men.

Waitemata Asians had 40%-60% of the mortality rate of all the residents of New Zealand (rate ratio: 63% for women and 40% for men) using the data in **Table 37**. Using the same logic as used before, if the rate ratios can be applied to the GBD 2010 mortality rates, there would be 96 deaths per 100,000 for women and 80 per 100,000 for men. These rates are clearly the lowest of all the countries from the list, particularly for men. There were variations within Asian sub-groups; Chinese people had the lowest rate of mortality than the other two Asian sub-groups regardless of sex.

In Auckland DHB, the rate ratios were 70% for women and 65% for men relative to the rate for all New Zealand residents. When these ratios are applied to the New Zealand rate in GBD 2010, we will have 105 deaths per 100,000 for females and 132 per 100, 000 for males. Just like the Asians in Waitemata DHB, these rates are also the lowest at country level. As for Asian sub-groups, Chinese women were leading, followed by Indian and Other Asian women with very similar rates; for men, Chinese also had the lowest mortality rate while Indian men had the highest rate.

Table 36 Age standardised mortality rate, cardiovascular disease, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	128.9	116.8	158.6	164.3	156.5	172.4
Canada	121.7	109.3	150.3	164.9	155.8	174.8
China	267.2	239.7	283.7	352.7	330.8	374.8
India	345.0	273.8	395.1	453.6	392.1	518.8
New Zealand	**151.1**	**137.8**	**173.4**	**202.8**	**192.4**	**212.1**
Singapore	150.3	119.1	176.1	202.4	193.3	212.9
Republic of Korea	156.1	144.8	186.4	168	158.5	177.2
UK	148.6	140.5	177.9	204.7	197.0	209.3

Table 37 Age standardised mortality rate, cardiovascular disease, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**99.7**	**99.4**	**99.9**	**138.9**	**138.5**	**139.3**
Waitemata Asian	63.2	61.3	65.2	55.0	52.9	57.2
Waitemata European/Other	74.9	74.2	75.6	103.3	102.3	104.3
Auckland Asian	69.4	67.9	71.0	90.3	88.1	92.5
Auckland European/Other	83.7	82.9	84.5	117.8	116.5	119.0

Table 38 Age standardised mortality rate, cardiovascular disease, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	58.0	55.5	60.4	40.3	37.8	42.8
	Indian	81.7	76.0	87.4	69.5	63.8	75.3
	Other Asian	72.1	68.1	76.1	82.7	77.0	88.4
Auckland	Chinese	45.8	44.2	47.4	66.1	63.8	68.4
	Indian	101.3	97.8	104.8	127.2	122.6	131.9
	Other Asian	104.6	99.2	110.0	97.0	90.0	104.0

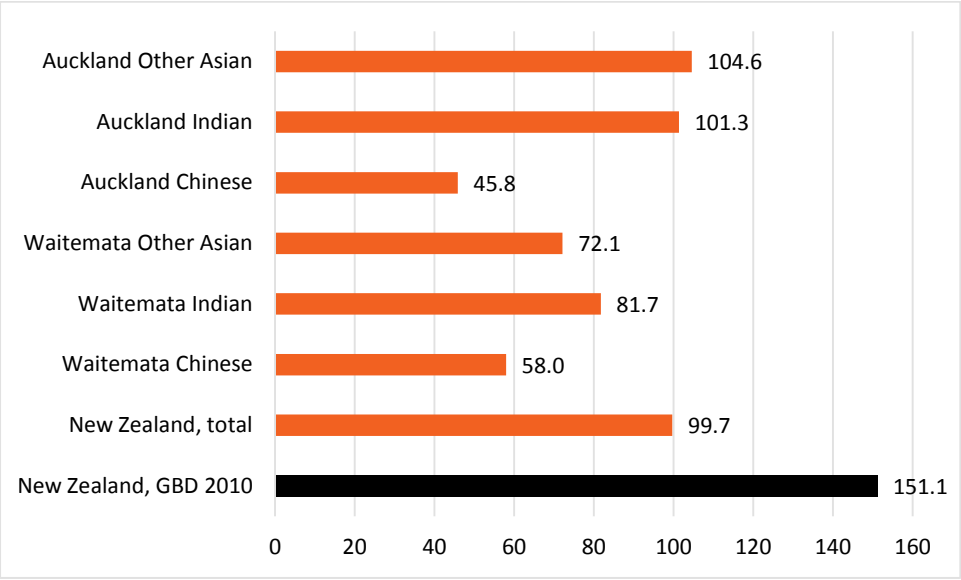


Figure 53 Age standardised mortality rate, cardiovascular disease, Asian-subgroups, female

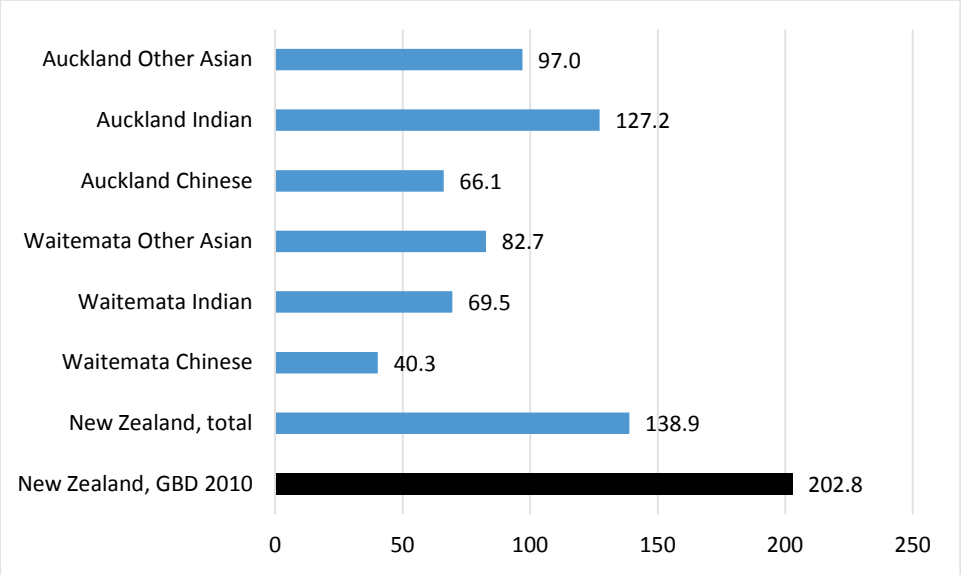


Figure 54 Age standardised mortality rate, cardiovascular disease, Asian-subgroups, male

YLL rate

Australia and Canada had lower YLL rates than New Zealand, particularly for men (men of the Republic of Korea also did better than New Zealand men). India and China had the highest rates for women and men (rate ratio: 2-3 for India and roughly 2 for China relative to New Zealand).

Waitemata DHB Asians had 40%-55% of the YLL rate of all the residents of New Zealand (rate ratio: 55% for women and 41% for men) using the data in **Table 40**. When the rate ratios are applied to the GBD 2010 mortality rates, we would have 937 YLLs per 100,000 women and 1,216 per 100,000 men. Again, these rates are clearly the lowest of all the countries from the list, particularly for men. Within Asian sub-groups, Chinese residents had the lowest rate of mortality than the other two Asian sub-groups regardless of sex.

In Auckland DHB, the rate ratios were 55% for women and 57% for men relative to the rate for all New Zealand residents. When these ratios are applied to the New Zealand rate in GBD 2010, we will have 934 years of life lost per 100,000 women and 1,714 per 100, 000 men. Just like the Asians in Waitemata DHB, these rates are still the lowest at country level. Women of Other Asian ethnicities had the highest rate of lost life years and for men, Indian people had the highest rate; Chinese ethnicity did the best for both females and males.

Table 39 Age standardised YLLs, cardiovascular disease, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	1326.3	1217.0	1688.6	2301	2218.8	2387.0
Canada	1358.8	1245.1	1701.6	2464.6	2364.7	2574.6
China	3649.4	3229.8	3962.5	5692.8	5268.8	6121.7
India	5894.1	4541.3	6946.4	8883.3	7493.5	10404.3
New Zealand	**1690.6**	**1562.6**	**2013.6**	**2991.2**	**2868.7**	**3109.7**
Singapore	1756.7	1434.2	2128.8	3154.7	3025.6	3288.9
Republic of Korea	1636.1	1504.3	2071.6	2357.8	2242.0	2469.6
UK	1727.4	1634.1	2115.9	3137.1	3053.9	3198.7

Table 40 Age standardised YLLs, cardiovascular disease, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**1618.2**	**1616.7**	**1619.7**	**2821.8**	**2819.6**	**2824.0**
Waitemata Asian	897.3	889.2	905.3	1146.8	1136.1	1157.5
Waitemata European/Other	1100.9	1096.8	1104.9	1927.6	1921.8	1933.3
Auckland Asian	894.3	888.1	900.6	1616.5	1605.6	1627.4
Auckland European/Other	1086.2	1082.1	1090.2	2042.2	2035.2	2049.1

Table 41 Age standardised YLLs, cardiovascular disease, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	730.6	720.9	740.2	755.8	743.1	768.5
	Indian	1287.5	1263.7	1311.3	1524.4	1496.8	1552.0
	Other Asian	1069.2	1052.4	1086.0	1736.1	1709.8	1762.4
Auckland	Chinese	530.2	523.8	536.6	933.9	924.3	943.5
	Indian	1360.2	1346.4	1374.0	2249.3	2228.0	2270.6
	Other Asian	1432.1	1409.6	1454.6	2154.7	2120.6	2188.8

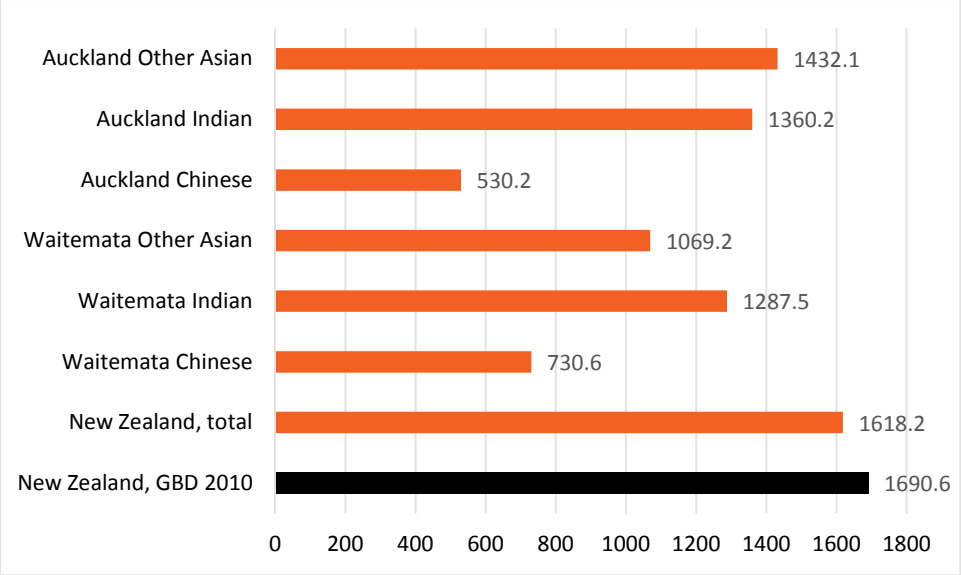


Figure 55 Age standardised YLLs, cardiovascular disease, Asian-subgroups, female

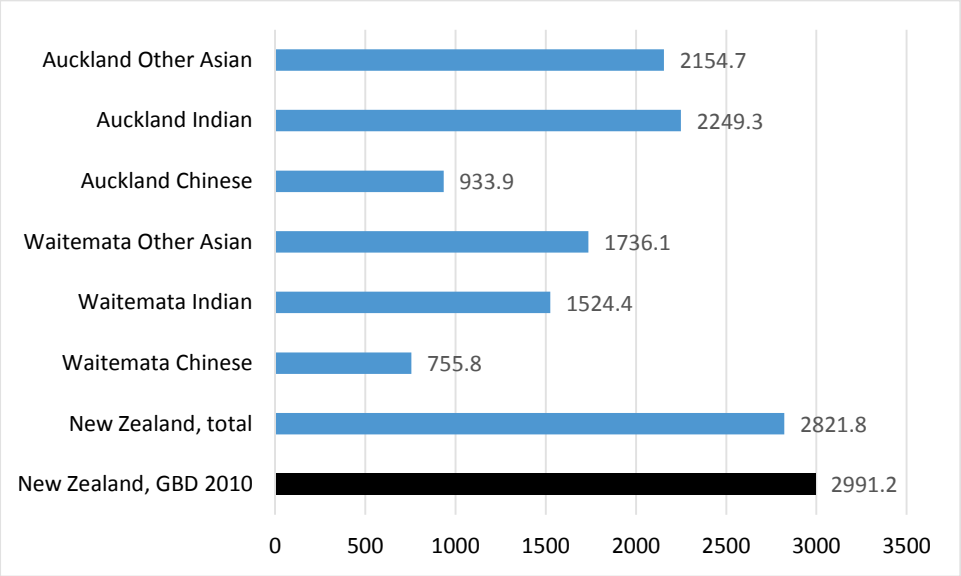


Figure 56 Age standardised YLLs, cardiovascular disease, Asian-subgroups, male

Neoplasm

Burden of neoplasm at country level, GBD 2010

India had a much better age standardised mortality rate due to neoplasm than New Zealand (both sexes combined, 156 per 100,000; 95%UI: 132, 182). Singapore and Australia ranked No. 2 and 3. New Zealand was similar to all other countries including Australia in neoplasm mortality rate (the difference from Australia was not statistically significant either). Cancers of the digestive system such as liver cancer and stomach cancer (oesophageal cancer for China as well) were very common in Asian countries but not so prevalent in non-Asian countries including New Zealand, Australia, Canada and the UK, although tracheal, bronchus, and lung cancer was the leading cancers in most countries on the list (**Table 42**).

China had the highest rate of DALYs while India did the best and Singapore did the second best. The DALY rates for neoplasm were comparable between New Zealand, Australia, Canada, the UK and the Republic of Korea, though Australia did marginally better (ranked the third). **Table 43** shows the DALY rate for all the cancers included in the GBD 2010 at country level. The distribution of YLL rate by country was similar to the one for DALYs. The YLDs pattern was very different from the aforementioned three metrics of burden of disease: all the Asian countries led by India and China had lower rates than the other countries on the list, and New Zealand seemed to have the highest rate of YLDs although New Zealand's rate was statistically comparable to other countries except India and China. There may be many factors related to this such as better health care and survival rates of cancers in the non-Asian countries which might be contributory, however require confirmation. The proportion of YLDs of the total DALYs indicated that the Asian countries had lower YLDs contributions (China and India less than 3%, Korea 3.5% and Singapore 4.5%).

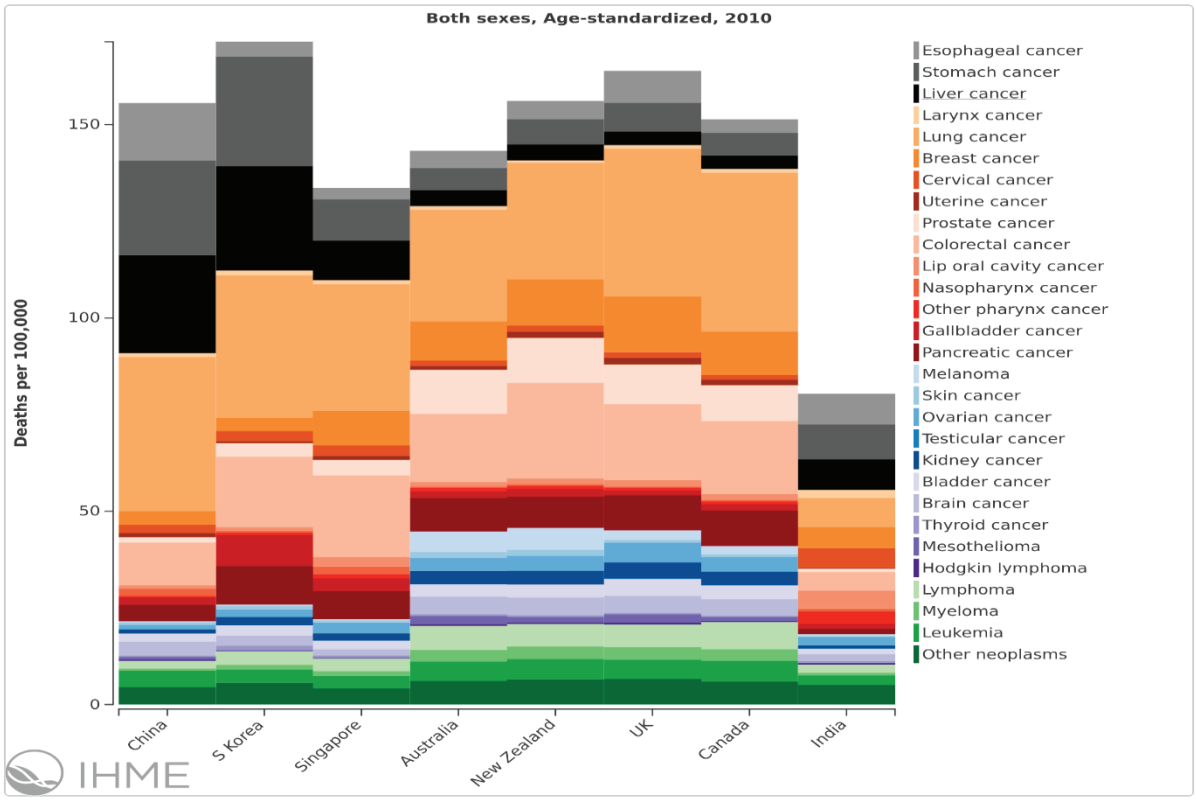


Figure 57 Age standardised mortality rate for neoplasm, both sexes, GBD 2010

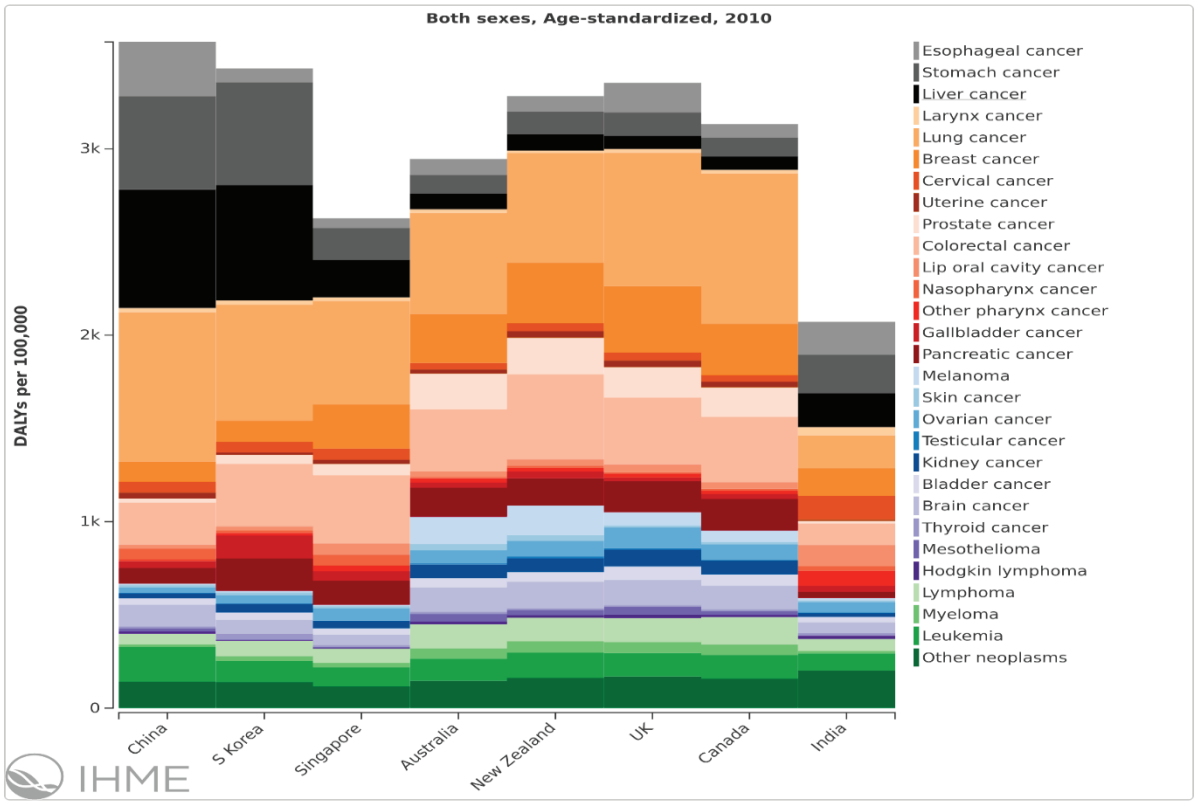


Figure 58 Age standardised DALYs for neoplasm, both sexes, GBD 2010

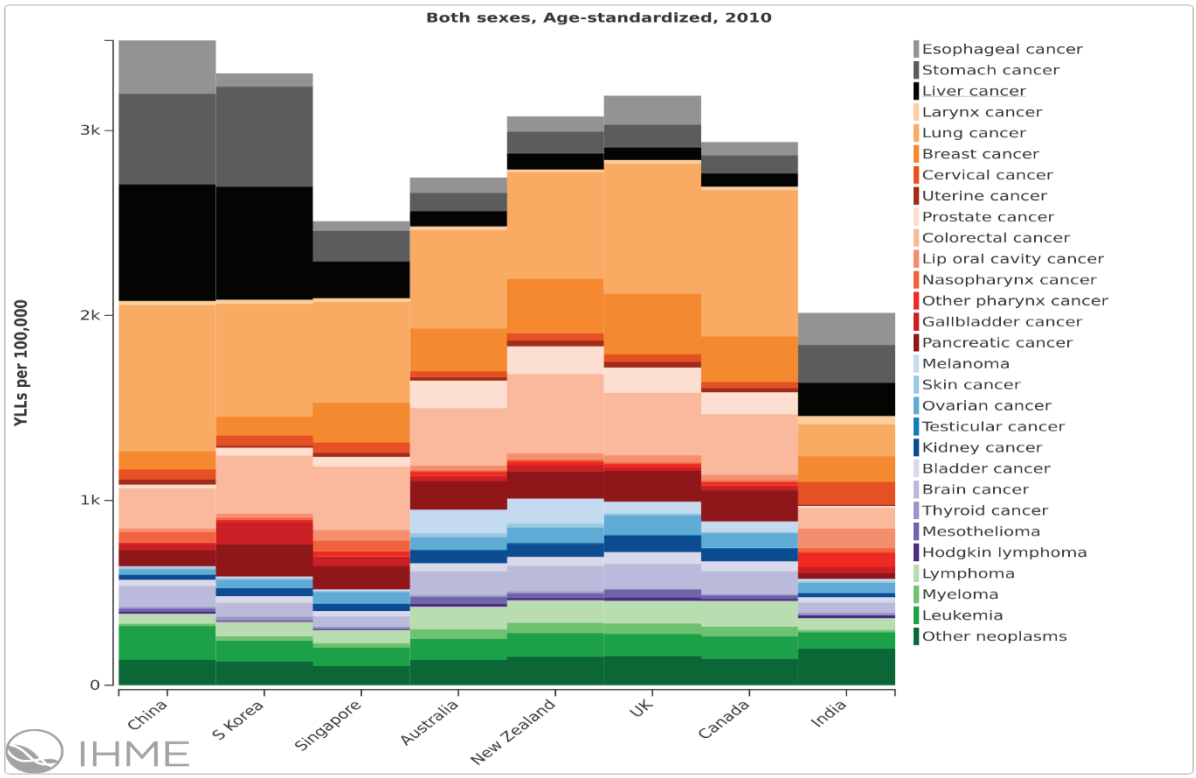


Figure 59 Age standardised YLLs for neoplasm, both sexes, GBD 2010

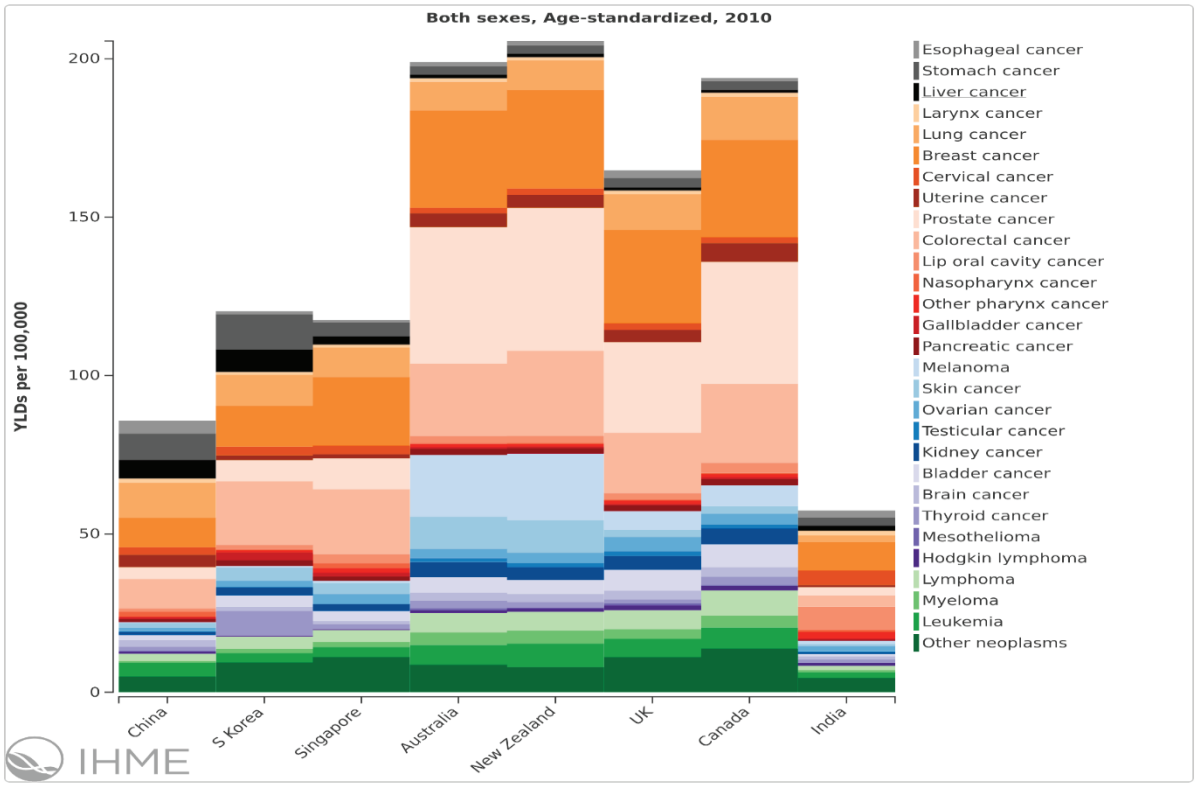


Figure 60 Age standardised YLDs for neoplasm, both sexes, GBD 2010

Table 42 Age standardised mortality rate of main neoplasms, both sexes, GBD 2010*

Neoplasm[#]	Australia	Canada	China	India	New Zealand	Singapore	South Korea	United Kingdom
Testicular cancer	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.1
Nasopharynx cancer	0.3	0.3	2.0	0.8	0.4	1.9	0.4	0.2
Hodgkin lymphoma	0.4	0.3	0.3	0.4	0.4	0.1	0.1	0.5
Thyroid cancer	0.4	0.4	0.4	0.5	0.5	0.5	1.2	0.4
Larynx cancer	0.9	1.0	1.0	2.0	0.7	1.1	1.3	0.9
Mesothelioma	2.2	1.0	0.7	0.1	1.4	0.2	0.2	2.2
Lip and oral cavity cancer	1.2	1.5	0.8	4.7	1.5	2.5	1.0	1.7
Cervical cancer	1.4	1.3	2.1	4.9	1.5	2.7	2.7	1.5
Non-melanoma skin cancer	1.5	0.6	0.7	0.3	1.6	0.4	0.8	0.7
Uterine cancer	1.0	1.4	1.1	0.3	1.7	1.1	0.5	1.8
Gallbladder and biliary tract cancer	1.6	1.6	1.9	1.3	2.0	3.2	7.9	1.2
Multiple myeloma	3.0	3.0	0.6	0.6	3.3	1.2	1.2	3.2
Bladder cancer	3.2	3.7	2.1	1.5	3.4	2.2	2.7	4.4
Kidney cancer	3.4	3.4	1.1	0.8	3.4	1.9	2.1	4.3
Ovarian cancer	3.3	3.8	1.0	2.1	3.8	2.8	2.0	5.0
Liver cancer	4.2	3.5	25.3	8.0	4.2	10.3	27.0	3.6
Brain and nervous system cancer	4.5	4.2	3.6	1.8	4.6	1.7	2.6	4.4
Esophageal cancer	4.5	3.5	14.8	7.8	4.6	2.9	3.8	8.3
Leukemia	5.1	5.4	4.2	2.4	5.3	3.2	3.4	5.0
Malignant skin melanoma	5.3	2.2	0.3	0.4	5.7	0.4	0.4	2.5
Non-Hodgkin lymphoma	6.2	7.0	2.0	2.2	5.8	3.2	3.5	5.9
Stomach cancer	5.7	5.8	24.6	9.0	6.5	10.6	28.3	7.4
Pancreatic cancer	8.7	9.2	4.2	1.4	8.0	7.3	10.0	9.0
Prostate cancer	11.4	9.2	1.4	0.9	11.6	4.1	3.5	10.2
Breast cancer	10.1	11.2	3.5	5.6	12.0	8.9	3.5	14.4
Colon and rectum cancer	17.7	19.0	11.0	4.8	24.7	21.0	18.2	19.6
Tracheal, bronchus, and lung cancer	28.9	41.1	39.9	7.5	30.1	32.7	36.8	38.2

* Data ranked by the rate of New Zealand; # 'Other pharynx cancer' and 'Other neoplasm' not included.

Table 43 Age standardised DALYs of main neoplasms, both sexes, GBD 2010*

Neoplasm	Australia	Canada	China	India	New Zealand	Singapore	South Korea	United Kingdom
Testicular cancer	6.3	5.7	2.6	4.8	9.0	1.9	1.2	8.1
Thyroid cancer	10.6	9.2	9.3	12.1	10.6	10.2	30.1	8.1
Nasopharynx cancer	7.7	9.7	58.3	24.7	11.3	57.9	11.1	6.3
Hodgkin lymphoma	14.5	12.7	11.7	17.4	13.4	3.9	3.2	18.3
Larynx cancer	19.4	20.6	22.6	45.7	13.4	19.3	23.0	20.4
Other pharynx cancer	24.5	19.7	9.0	80.5	20.6	30.8	15.0	22.1
Mesothelioma	40.3	18.8	17.0	1.8	26.6	4.8	4.2	42.8
Non-melanoma skin cancer	32.9	11.6	13.3	7.2	31.0	9.4	12.8	11.4
Lip and oral cavity cancer	27.6	34.5	20.0	113.5	34.1	59.1	21.8	41.6
Gallbladder and biliary tract cancer	26.7	25.6	35.6	32.1	35.2	51.2	122.7	20.0
Uterine cancer	21.9	30.4	31.6	7.7	35.7	23.1	12.4	35.2
Cervical cancer	35.7	34.8	58.6	127.9	43.2	59.4	57.8	42.7
Bladder cancer	48.9	60.9	34.4	29.3	52.7	32.4	39.2	71.3
Multiple myeloma	55.9	56.1	13.8	14.5	61.5	23.9	25.3	58.9
Kidney cancer	73.5	73.4	26.8	21.0	74.4	39.8	46.2	91.3
Esophageal cancer	84.5	70.7	291.2	175.6	83.4	51.7	73.6	159.4
Ovarian cancer	69.9	82.1	28.5	55.7	83.7	66.8	45.6	109.8
Liver cancer	83.7	72.0	636.3	182.6	89.5	201.3	618.3	70.9
Stomach cancer	101.9	102.2	499.6	205.8	120.1	171.5	552.1	124.1
Non-Hodgkin lymphoma	128.6	147.1	56.9	63.6	126.3	75.9	82.5	129.3
Leukemia	118.6	126.8	185.7	91.6	133.8	102.7	113.1	126.0
Brain and nervous system cancer	132.7	128.0	117.6	57.8	141.8	58.0	75.8	135.8
Pancreatic cancer	156.2	170.5	85.7	32.7	146.6	128.7	174.3	166.0
Malignant skin melanoma	146.3	61.4	6.5	14.1	158.1	8.7	9.8	70.9
Other neoplasms	146.8	158.0	142.7	200.7	163.4	116.2	139.8	169.0
Prostate cancer	191.3	157.6	21.8	13.7	195.8	60.4	49.0	164.1
Breast cancer	263.1	276.1	107.2	147.3	322.9	236.6	113.3	356.3
Colon and rectum cancer	334.5	350.4	226.9	114.4	456.0	366.1	335.4	358.3
Tracheal, bronchus, and lung cancer	540.6	804.5	801.1	175.4	588.3	555.5	621.9	715.3

* Data ranked by the rate of New Zealand

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

India, China, Singapore, Australia and Korea did better in women's neoplasm mortality rate than New Zealand, which had rates comparable to Canada and the UK. For men, India and Singapore had lower rates than New Zealand which had similar rates to Australia, Canada, the UK and even China, whereas Korean men had the highest rate of mortality.

Waitemata Asians had 44%-60% of the mortality rate of all the residents of New Zealand (rate ratio: 44% for women and 61% for men) using the data in **Table 45**. Using the same logic as used before, if the rate ratios are applied to the GBD 2010 mortality rates, there would be 58 deaths per 100,000 women and 113 per 100,000 men. These rates are no doubt the lowest of all the countries on the list. Indian and Other Asian women did better than Chinese women; for men, Chinese performed better than Indian and Other Asian.

In Auckland DHB, the rate ratios were 53% for both women and men relative to the rate for all New Zealand residents. When these ratios are applied to the New Zealand rate in GBD 2010, there would be 71 deaths per 100,000 for females and 97 per 100, 000 for males. Again, these rates are the lowest at country level. Within Asian sub-groups, Indian and Other Asian women had comparable rates but both did better than Chinese women; Indian men almost halved the rates for Chinese and Other Asian men.

Table 44 Age standardised mortality rate, neoplasm, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	113.2	98.9	119.3	180.2	171.2	188.7
Canada	128.3	112.3	135.8	181.7	174.1	191.6
China	108.4	100	118.6	208.1	192.5	223.9
India	75.2	64	87.4	86.2	73.9	100.2
New Zealand	**134.0**	**121.1**	**141**	**184.3**	**175.6**	**196.2**
Singapore	108.7	97.6	121.2	165.9	158.2	176.2
Republic of Korea	113.8	98.2	121.3	256.5	245.9	272.6
UK	141.2	126.3	146.0	194.3	186.4	201.4

Table 45 Age standardised mortality rate, neoplasm, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**127.2**	**126.8**	**127.6**	**174.2**	**173.8**	**174.7**
Waitemata Asian	55.4	53.3	57.6	107.1	104.0	110.2
Waitemata European/Other	118.4	117.0	119.7	154.4	153.1	155.8
Auckland Asian	67.5	65.4	69.5	91.5	89.0	94.0
Auckland European/Other	113.2	111.6	114.8	160.6	158.9	162.3

Table 46 Age standardised mortality rate of main neoplasms, by sex, New Zealand, 2010-12*

Neoplasm	Female			Male		
	Rate	95% CI		Rate	95% CI	
Prostate cancer				28.6	28.5	28.7
Mouth and oropharynx cancer	1.3	1.2	1.3	3.5	3.4	3.5
Bladder cancer	1.9	1.9	2.0	5.2	5.2	5.3
Cervix uteri cancer	2.0	2.0	2.1			
Oesophagus cancer	2.2	2.2	2.3	5.6	5.5	5.6
Stomach cancer	3.3	3.2	3.3	6.4	6.4	6.5
Corpus uteri cancer	3.7	3.6	3.7			
Leukaemia	4.2	4.1	4.2	7.2	7.1	7.3
Ovary cancer	5.6	5.5	5.7			
Melanoma and other skin cancers	5.7	5.6	5.8	11.7	11.5	11.8
Liver cancer	6.3	6.2	6.4	10.4	10.3	10.5
Lymphomas and multiple myeloma	6.9	6.8	7.0	10.9	10.7	11.0
Pancreas cancer	7.1	7.0	7.2	8.3	8.2	8.4
Other malignant neoplasm	12.9	12.8	13.1	21.6	21.4	21.8
Colon and rectum cancers	18.5	18.3	18.6	24.3	24.1	24.5
Trachea, bronchus and lung cancers	22.3	22.1	22.4	29.6	29.5	29.8
Breast cancer	23.7	23.5	23.9	0.2	0.1	0.2

* Rank by the mortality rate for women

Table 47 Age standardised mortality rate, neoplasm, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	73.6	70.0	77.1	81.3	77.7	84.9
	Indian	33.4	29.9	36.9	99.1	91.9	106.2
	Other Asian	37.1	33.7	40.6	167.0	159.4	174.6
Auckland	Chinese	80.0	76.9	83.1	103.7	99.7	107.7
	Indian	49.8	46.4	53.3	57.8	54.5	61.0
	Other Asian	53.8	49.0	58.5	106.0	98.5	113.6

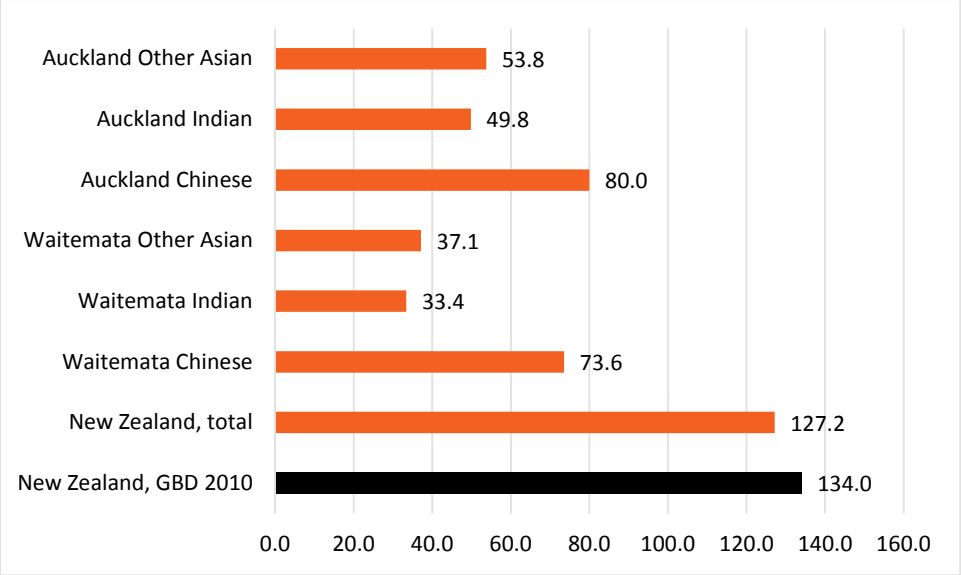


Figure 61 Age standardised mortality rate, neoplasm, Asian-subgroups, female

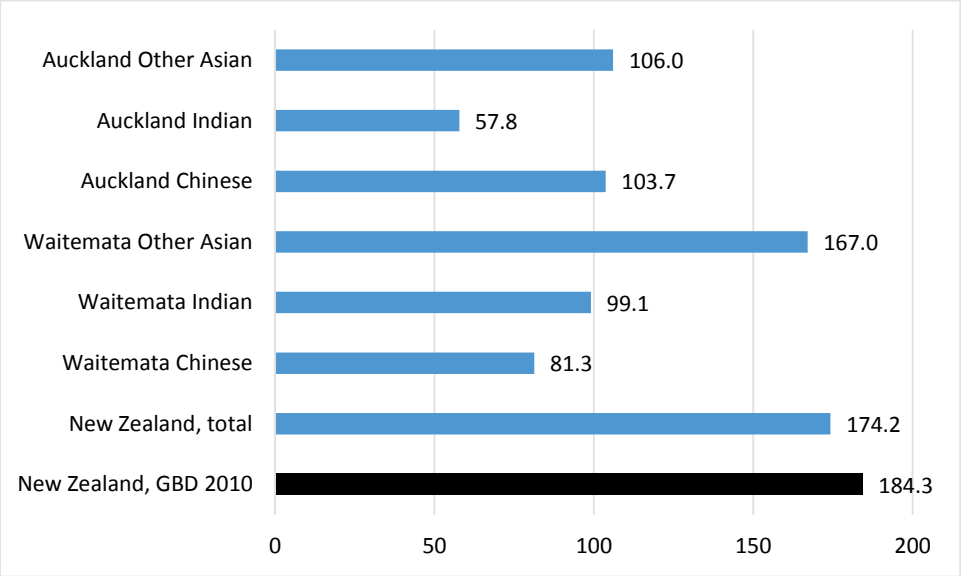


Figure 62 Age standardised mortality rate, neoplasm, Asian-subgroups, male

YLLs

India, Singapore, Australia and Korea did better in women's YLL rates of neoplasm than New Zealand, which had comparable rates to Canada and the UK. For men, India and Singapore had lower rates than New Zealand which had similar rates to Australia, Canada and the UK, while Korean and Chinese men had the highest rate of YLLs.

Waitemata Asians had 40%-60% of the YLL rate of all the residents of New Zealand (rate ratio: 40% for women and 57% for men) using the data in **Table 49**. When the rate ratios are applied to the GBD 2010 YLL rates, there would be 1,134 YLLs per 100,000 women and 1,937 per 100,000 men. These rates are believed to be the lowest of all the countries from the list. Indian and Other Asian women did better than Chinese women; for men, Chinese performed better than Indian followed by Other Asian.

In Auckland DHB, the rate ratios were roughly 50% for both women and men relative to the rate for all New Zealand residents. We will have 1,392 years of life lost per 100,000 women and 1,728 per 100, 000 men, when these ratios are applied to the New Zealand rate in GBD 2010. No doubt, these rates are the lowest at country level. Within Asian sub-groups, Other Asian women did the best followed by Indian women; Indian men halved the rate for Chinese which still performed better than Other Asian men.

Table 48 Age standardised YLLs, neoplasm, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	2289.9	2070.1	2377.8	3264.4	3136.9	3419.9
Canada	2612.0	2381.1	2710.8	3336.3	3226.3	3486.5
China	2437.9	2226.1	2675.5	4581.8	4204.7	4965.3
India	1906.8	1609.2	2227.3	2129.3	1785.8	2504.6
New Zealand	**2802.6**	**2579.7**	**2927.7**	**3405.9**	**3263.2**	**3596.4**
Singapore	2105.9	1897.4	2291.5	2995.1	2857.2	3196.4
Republic of Korea	2171.6	1940.1	2281.3	4758.5	4545.8	5124.9
UK	2876.9	2636.8	2964.0	3575.3	3460.7	3692.4

Table 49 Age standardised YLLs, neoplasm, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**3288.3**	**3285.8**	**3290.8**	**3981.3**	**3978.7**	**3983.9**
Waitemata Asian	1330.1	1318.5	1341.6	2264.5	2249.0	2280.1
Waitemata European/Other	3059.6	3051.1	3068.2	3459.9	3451.5	3468.3
Auckland Asian	1632.6	1621.4	1643.8	2019.9	2005.9	2034.0
Auckland European/Other	2819.2	2809.3	2829.1	3485.1	3475.0	3495.1

Table 50 Age standardised YLLs of main neoplasms, by sex, New Zealand, 2010-12*

Neoplasm	Female			Male		
	Rate	95% CI		Rate	95% CI	
Prostate cancer				455.3	454.6	455.9
Mouth and oropharynx cancer	35.7	35.4	35.9	96.3	95.8	96.7
Bladder cancer	38.3	38.0	38.5	92.0	91.6	92.3
Oesophagus cancer	49.5	49.2	49.8	133.8	133.4	134.3
Cervix uteri cancer	75.2	74.7	75.6			
Corpus uteri cancer	90.2	89.8	90.5			
Stomach cancer	94.0	93.5	94.4	162.3	161.7	162.8
Leukaemia	119.5	118.9	120.1	185.9	185.2	186.6
Melanoma and other skin cancers	135.9	135.4	136.4	267.1	266.4	267.7
Ovary cancer	154.0	153.5	154.6			
Lymphomas and multiple myeloma	156.9	156.4	157.4	254.6	253.9	255.3
Pancreas cancer	166.2	165.7	166.7	196.0	195.5	196.6
Liver cancer	182.2	181.5	183.0	303.4	302.6	304.3
Other malignant neoplasm	378.0	377.0	379.0	653.8	652.5	655.2
Colon and rectum cancers	409.4	408.6	410.2	527.5	526.7	528.4
Trachea, bronchus and lung cancers	557.8	556.9	558.7	685.9	684.9	686.9
Breast cancer	684.4	683.2	685.6	3.2	3.2	3.3

* Sorted by the mortality rate for women

Table 51 Age standardised YLLs, neoplasm, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	1689.4	1670.4	1708.4	1613.1	1595.0	1631.2
	Indian	720.7	702.4	739.0	2539.3	2502.4	2576.3
	Other Asian	1096.3	1077.3	1115.3	3183.4	3148.2	3218.5
Auckland	Chinese	1846.7	1830.1	1863.4	2334.5	2307.9	2361.1
	Indian	1377.9	1358.2	1397.5	1035.1	1020.2	1050.1
	Other Asian	1332.0	1307.8	1356.2	2833.9	2794.5	2873.2

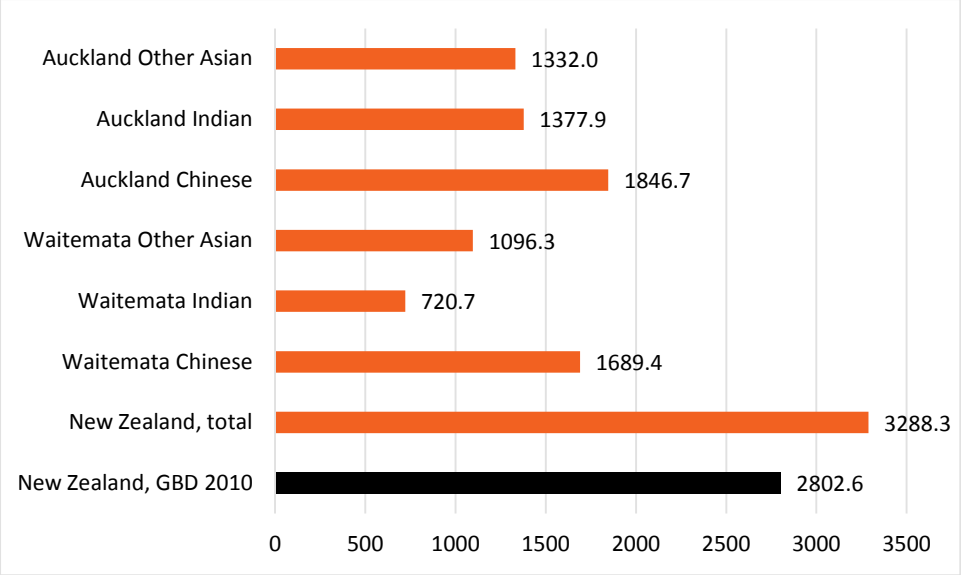


Figure 63 Age standardised YLLs, neoplasm, Asian-subgroups, female

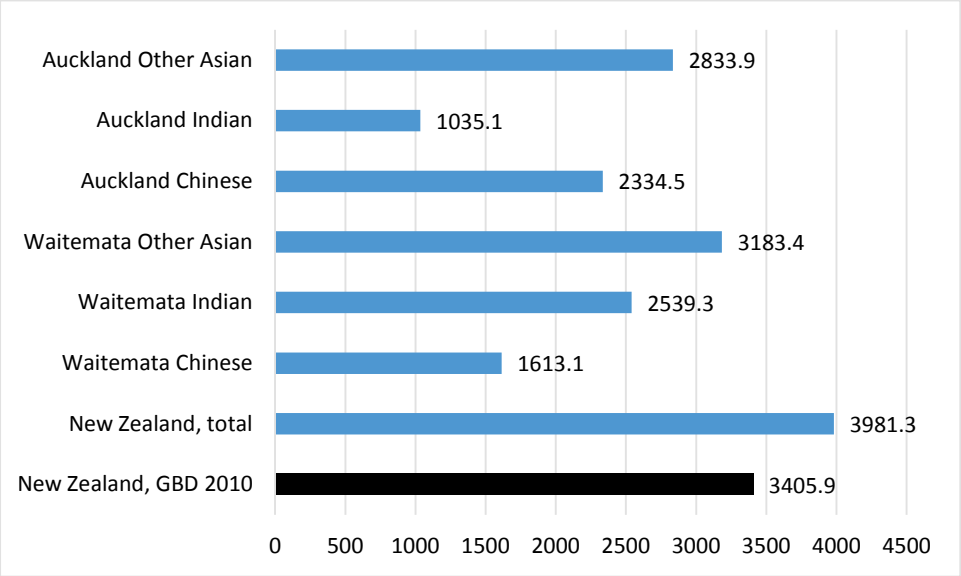


Figure 64 Age standardised YLLs, neoplasm, Asian-subgroups, male

Diabetes mellitus

Burden of diabetes at country level, GBD 2010

India and the Republic of Korea had the highest mortality rates. New Zealand had a comparable rate to China, Singapore and Australia, while the UK was leading the list. The distribution of YLLs followed a similar pattern to the mortality rate. For DALYs, India had the highest rate followed by Singapore and the Republic of Korea (the latter two countries were not statistically higher than New Zealand) and the UK still did the best though not significantly better than New Zealand. In terms of YLDs, Singapore and China had the highest rate and Australia had the lowest rate but the differences were not significantly different from that of New Zealand.

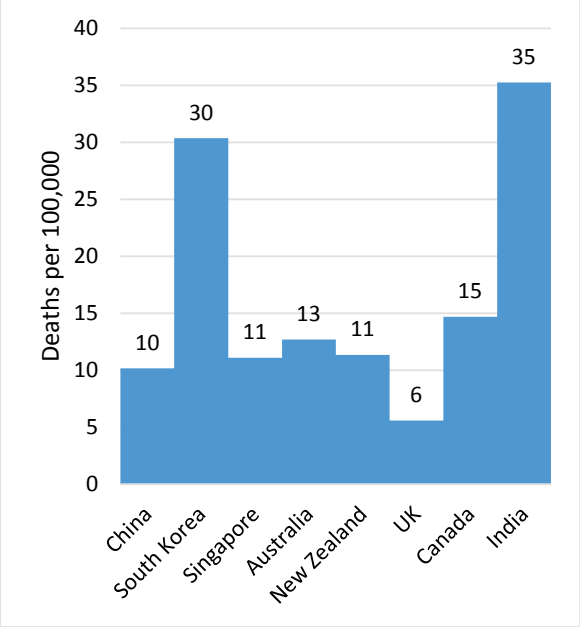


Figure 65 Age standardised mortality rate for diabetes, both sexes, GBD 2010

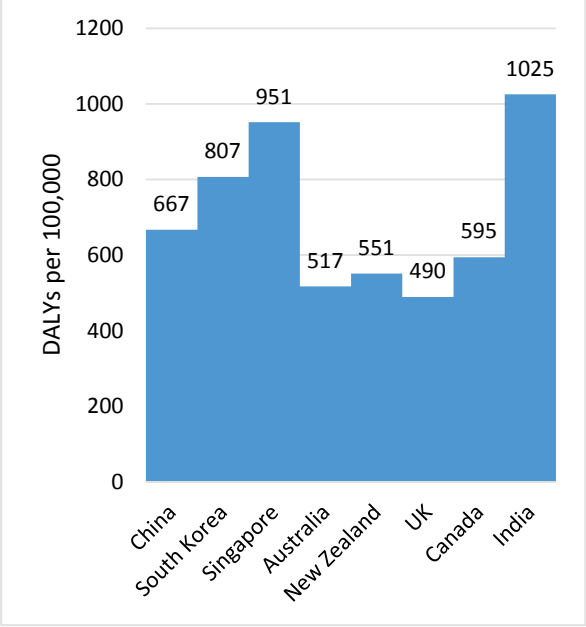


Figure 67 Age standardised DALYs for diabetes, both sexes, GBD 2010

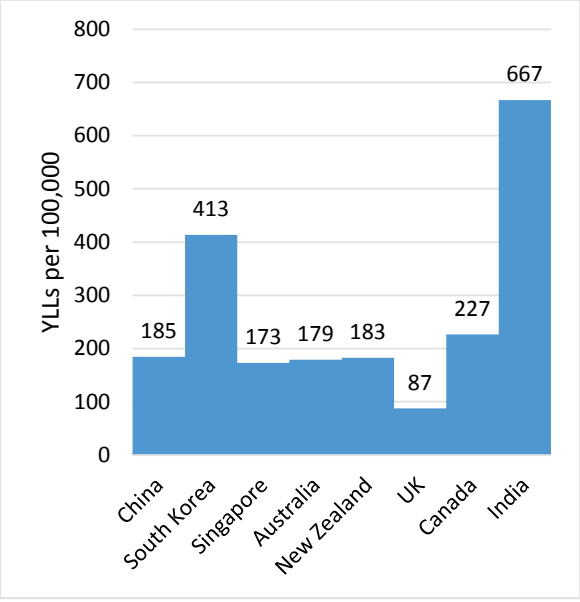


Figure 66 Age standardised YLLs for diabetes, both sexes, GBD 2010

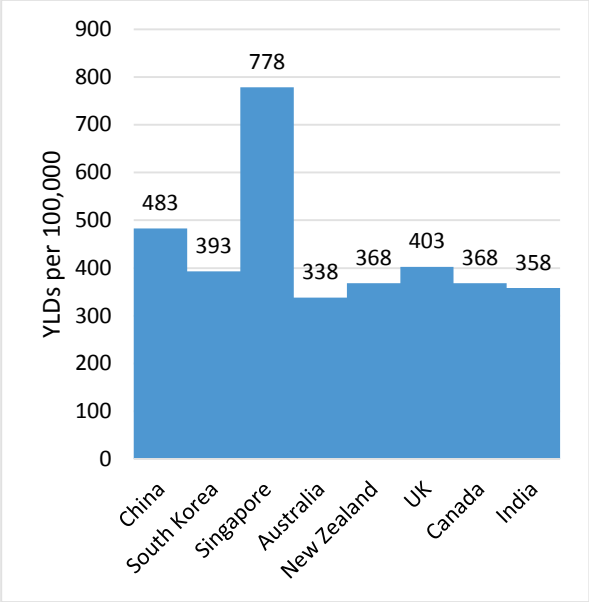


Figure 68 Age standardised YLDs for diabetes, both sexes, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

The Asian women in Waitemata DHB had a comparable rate of diabetes mortality to New Zealand but Asian men had a lower rate than the New Zealand men's average. The re-scaled mortality rates using the New Zealand rates in GBD 2010 as the reference, were 8.5 per 100,000 Asian women and 12.0 per 100,000 Asian men in Waitemata, which is likely to give Waitemata Asian women and men similar ranks to the New Zealand women and men's averages. However, there were large variations of mortality rates within Asian: Indian women and men and Other Asian men were several times higher than that of Chinese in mortality rate. If at country level, these rates would be close to India and Korea for both women and men.

The mortality rate for Auckland DHB women was higher than the New Zealand average for women, while the rate for Auckland men was slightly lower than the New Zealand men's average. The rescaled mortality rates were 12 per 100,000 for Auckland Asian women and men. The new figures would not make Auckland Asian women and men stand out from the rates at country level in GBD 2010, yet still much lower than the rates for India and Korea. By Asian sub-group, Auckland Indians still had the highest rate of mortality due to diabetes for both women and men and at a country level would be in third place after India and Korea in the GBD study.

Table 52 Age standardised mortality rate, diabetes, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	10.5	8.9	11.8	15.2	14	16.7
Canada	12	10.3	14	17.8	16	19.8
China	10.4	9.4	11.6	10.1	9.3	10.8
India	32.2	26.5	38.3	38.6	32.4	46
New Zealand	**9.2**	**7.7**	**10.5**	**13.8**	**12.4**	**15.4**
Republic of Korea	27.4	21.4	31.1	33.2	30.7	36.3
Singapore	11.5	9.8	16.1	10.3	9.2	11.4
UK	4.9	4.4	5.2	6.3	6.1	6.6

Table 53 Age standardised mortality rate, diabetes, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**8.9**	**8.8**	**9.0**	**12.4**	**12.3**	**12.5**
Waitemata Asian	8.3	7.5	9.0	10.8	9.8	11.7
Waitemata European/Other	4.0	3.9	4.2	6.2	6.0	6.4
Auckland Asian	12.0	11.3	12.7	11.1	10.3	11.9
Auckland European/Other	3.6	3.4	3.8	7.6	7.3	8.0

Table 54 Age standardised mortality rate, diabetes, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	4.9	4.2	5.6	1.6	1.0	2.2
	Indian	21.7	18.7	24.7	28.5	25.0	32.0
	Other Asian	5.0	3.8	6.2	24.4	21.3	27.6
Auckland	Chinese	11.5	10.8	12.3	5.4	4.8	5.9
	Indian	16.2	14.6	17.8	26.6	24.2	29.0
	Other Asian	7.0	5.0	9.0	*	*	*

* Random small number, data not to be used

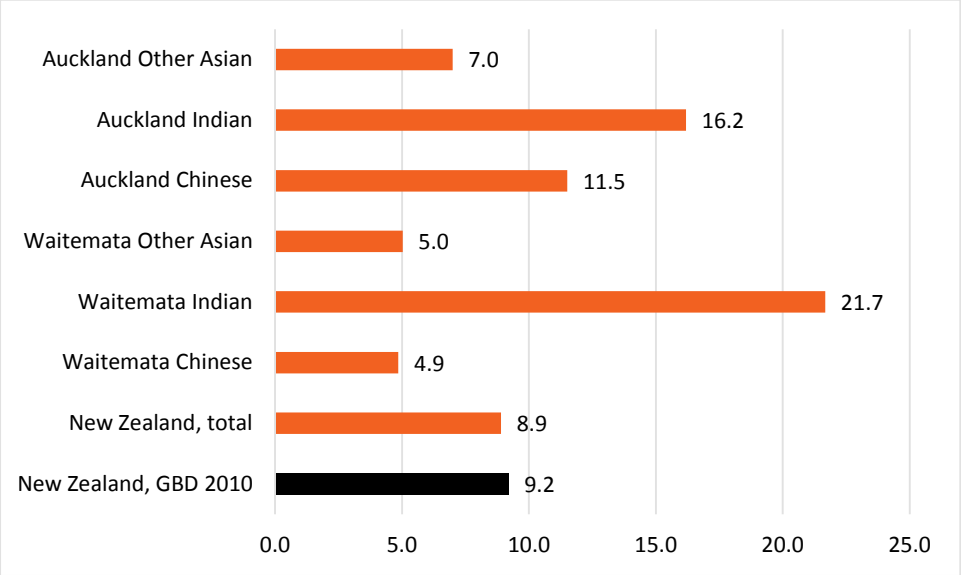


Figure 69 Age standardised mortality rate, diabetes, Asian-subgroups, female

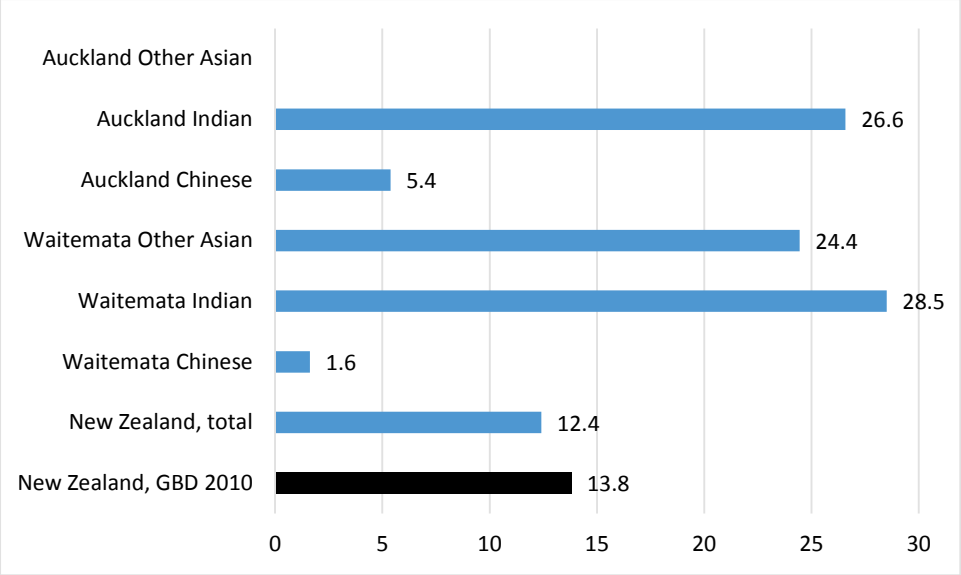


Figure 70 Age standardised mortality rate, diabetes, Asian-subgroups, male

YLLs

The rescaled YLL rates were 108 per 100,000 women and 159 per 100,000 men in Waitemata DHB, which may make Waitemata Asian the second best except for the UK for women and men, according to **Table 55**. However, Indian women and men and Other Asian men were very likely to follow closely behind India and Korea at the country level, while Chinese women and men may compete for the best against the UK.

Asians in Auckland DHB had the rescaled rates of 122 per 100,000 for women and 165 per 100,000 for men. The variations within Asian sub-groups in Auckland were very close to the pattern in Waitemata.

Table 55 Age standardised YLLs, diabetes, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	135.3	118.5	147.5	227.1	212.7	241.7
Canada	169.3	149.5	188.7	290.6	268.8	314.8
China	182.8	164.0	202.7	189.1	174.2	204.2
India	602.3	487.6	715.6	735.3	607.5	883.0
New Zealand	**137.3**	**117.1**	**153.8**	**233.0**	**211.9**	**254.6**
Singapore	169.5	146.5	242.1	174.9	158.5	189.9
Republic of Korea	322.4	279.3	353.5	514.9	481.2	549.3
UK	70.7	64.5	74.7	105.7	102.3	109.5

Table 56 Age standardised YLLs, diabetes, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**195.4**	**194.9**	**196.0**	**300.1**	**299.3**	**300.8**
Waitemata Asian	154.1	150.6	157.6	204.3	200.1	208.6
Waitemata European/Other	62.6	61.8	63.3	117.5	116.2	118.7
Auckland Asian	173.8	171.0	176.5	212.1	208.4	215.9
Auckland European/Other	65.7	64.4	66.9	159.2	157.2	161.1

Table 57 Age standardised YLLs, diabetes, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	67.9	65.1	70.7	50.0	46.6	53.3
	Indian	481.6	466.5	496.6	494.7	479.6	509.7
	Other Asian	89.3	84.2	94.3	433.1	419.9	446.4
Auckland	Chinese	126.3	123.7	128.8	63.4	61.4	65.3
	Indian	297.6	290.0	305.1	570.7	559.4	582.1
	Other Asian	149.1	139.8	158.3	*	*	*

* Random small number, data not to be used

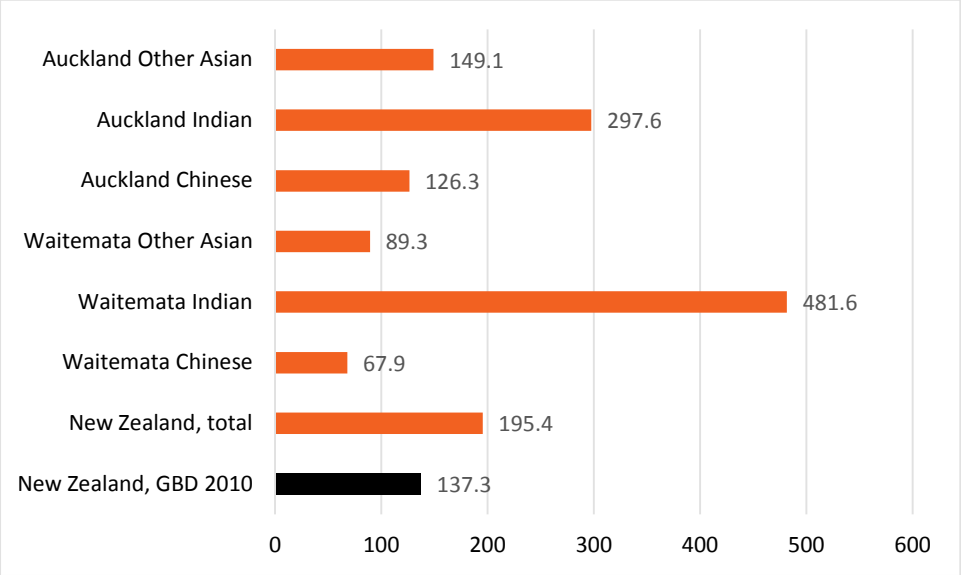


Figure 71 Age standardised YLLs, diabetes, Asian-subgroups, female

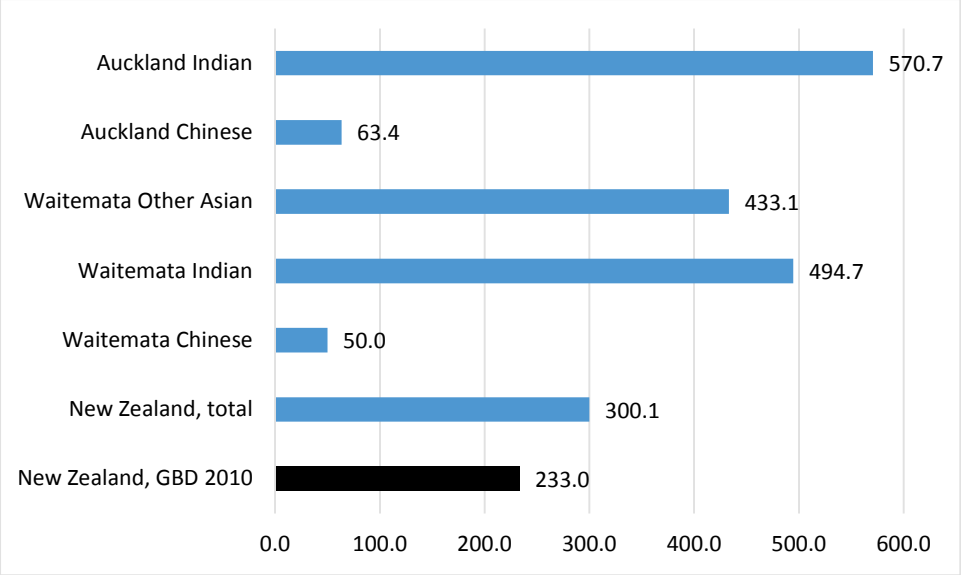


Figure 72 Age standardised YLLs, diabetes, Asian-subgroups, male

Alzheimer's disease and other dementias

Burden of diabetes at country level, GBD 2010

The Asian countries led by Singapore and the Republic of Korea had much lower mortality rates due to Alzheimer's disease and other dementias, whereas the 'Western countries' had very comparable rates including New Zealand, Australia, the UK and Canada. The distributions of DALYs and YLLs by country were very similar to that of the mortality rates.

Regarding YLDs, Singapore, China and India had a similarly lower rate than New Zealand which was comparable to Australia, Canada, the UK and the Republic of Korea. The burden of disability on the health and social sector warrants further work, with New Zealand being one of the top countries in YLD rates.

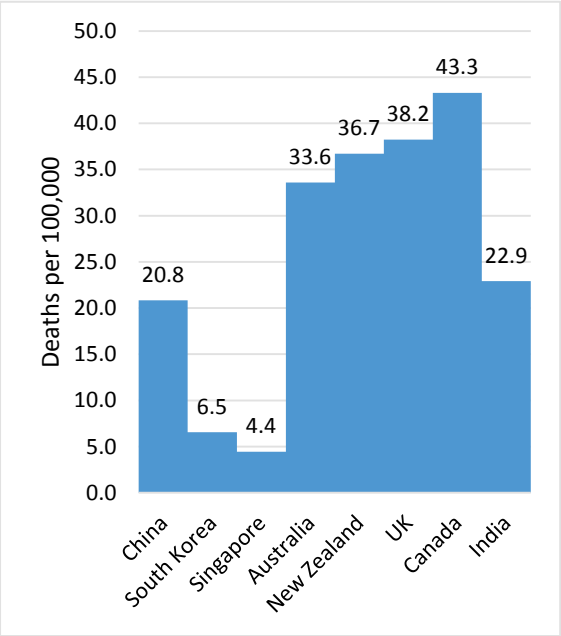


Figure 73 Age standardised mortality rate for Alzheimer's disease, both sexes, GBD 2010

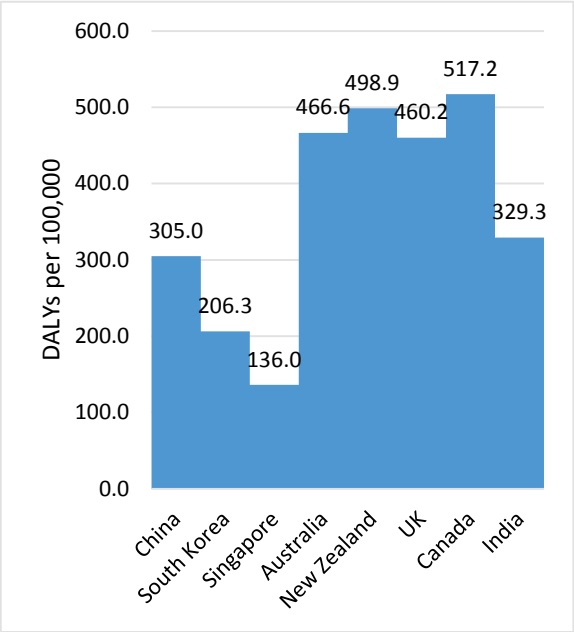


Figure 75 Age standardised DALYs for Alzheimer's disease, both sexes, GBD 2010

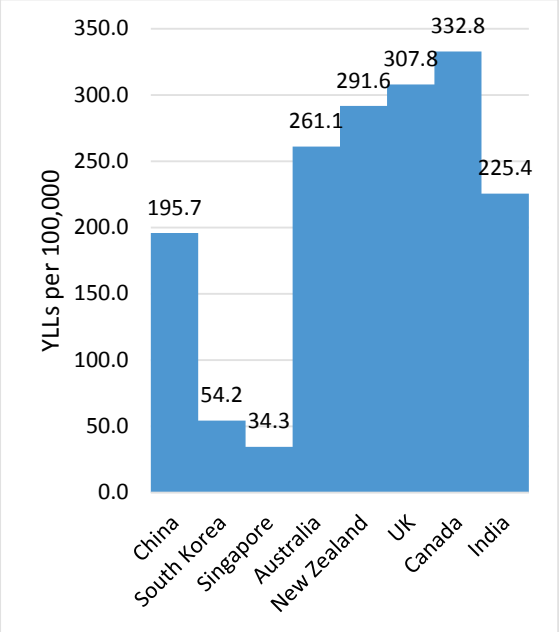


Figure 74 Age standardised YLLs for Alzheimer's disease, both sexes, GBD 2010

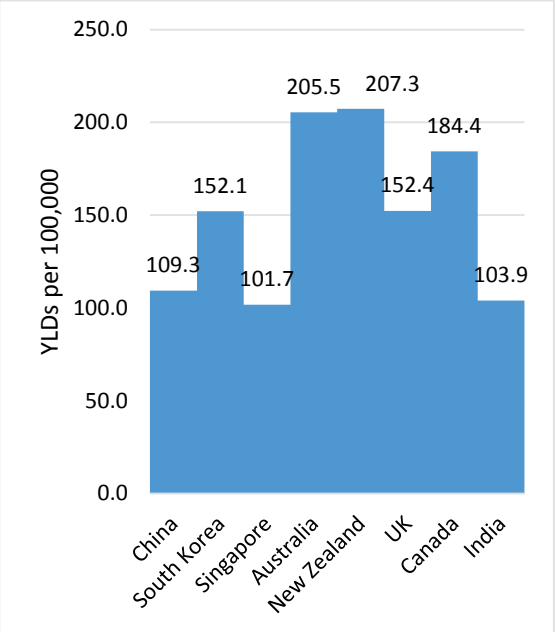


Figure 76 Age standardised YLDs for Alzheimer's disease, both sexes, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

The rescaled Asian mortality rates for Alzheimer's disease were 22 per 100,000 women and 19 per 100,000 men in Waitemata DHB, which placed Asian women and men at a place near China and India but behind Singapore and the Republic of Korea. Chinese in Waitemata seemed to enjoy a lower mortality rate, but the death numbers were small so the results should not be over-interpreted.

In Auckland DHB, the rescaled mortality rates were 25 and 21 per 100,000 for women and men respectively. It placed Auckland Asian residents at a comparable place to that of Asian peoples in Waitemata at the country level.

Table 58 Age standardised mortality rate, Alzheimer's disease, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	33.1	23.3	43.8	34.2	23.0	45.6
Canada	41.1	28.5	53.9	46.6	31.5	59.9
China	19.0	17.3	21.8	23.8	21.9	26.0
India	20.8	16.1	27.3	25.4	20.2	30.7
New Zealand	**37.0**	**23.6**	**51.2**	**36.2**	**26.8**	**46.0**
Singapore	4.1	2.8	5.7	5.0	3.5	6.6
Republic of Korea	5.9	4.0	8.0	7.9	5.5	10.7
UK	35.7	31.7	39.4	42.1	38.6	45.4

Table 59 Age standardised mortality rate, Alzheimer's disease, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**18.1**	**18.0**	**18.1**	**15.1**	**15.0**	**15.2**
Waitemata Asian	10.6	9.8	11.3	7.9	7.1	8.6
Waitemata European/Other	16.9	16.6	17.1	13.3	13.1	13.5
Auckland Asian	12.3	11.8	12.9	8.7	8.1	9.3
Auckland European/Other	27.6	27.2	28.0	22.0	21.6	22.3

Table 60 Age standardised mortality rate, Alzheimer's disease, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	8.6	7.7	9.6	6.1	5.4	6.9
	Indian	12.5	10.9	14.1	*	*	*
	Other Asian	9.4	8.3	10.6	18.3	15.8	20.9
Auckland	Chinese	15.4	14.6	16.1	5.4	4.8	5.9
	Indian	8.9	8.0	9.9	16.1	14.7	17.5
	Other Asian	7.1	6.0	8.2	3.7	2.3	5.0

* Data not usable

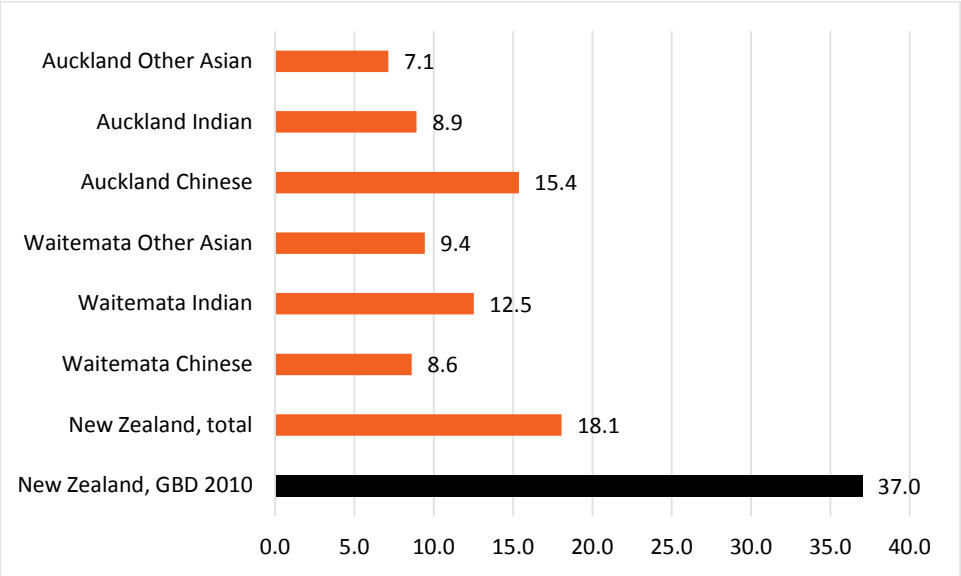


Figure 77 Age standardised mortality rate, Alzheimer's disease, Asian-subgroups, female

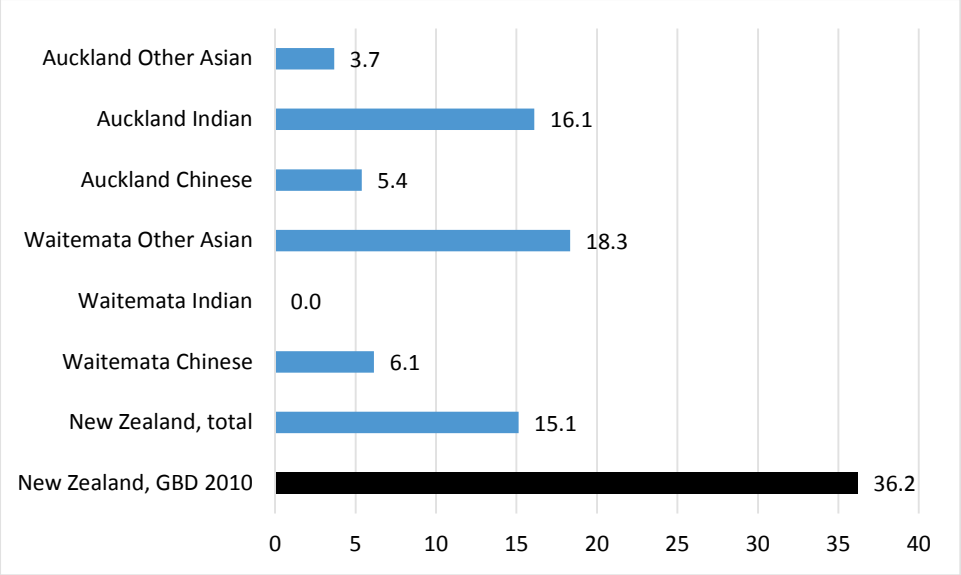


Figure 78 Age standardised mortality rate, Alzheimer's disease, Asian-subgroups, male

YLLs

The rescaled Asian YLL rates for Alzheimer's disease were 167 per 100,000 women and 198 per 100,000 men in Waitemata DHB, which placed Asian women and men near China and India but behind Singapore and the Republic of Korea, just like the pattern for mortality rates. Other Asian men had a quite high rate of years of life lost, which is not likely to be fully explained by random variation.

In Auckland DHB, the rescaled years of life lost rates were 145 and 158 per 100,000 for women and men respectively. It placed Auckland Asian residents at a comparable place as that of Asian peoples in Waitemata, at the country level according to **Table 61**.

Table 61 Age standardised YLLs, Alzheimer's diseases, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	246.3	185.4	309.6	282.2	206.1	364.3
Canada	296.5	218.1	383.1	384.9	282.1	479.7
China	168.3	153.8	192.0	233.6	215.4	254.5
India	202.8	161.3	255.4	252.6	206.1	304.1
New Zealand	**282.5**	**198.1**	**377.3**	**304.7**	**233.2**	**377.5**
Singapore	29.5	21.6	39.7	41.2	31.0	52.3
Republic of Korea	45.2	33.4	58.8	70.6	52.4	91.8
UK	274.6	247.6	299.2	355.7	329.3	380.0

Table 62 Age standardised YLLs, Alzheimer's diseases, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**200.8**	**200.5**	**201.2**	**198.5**	**198.1**	**198.9**
Waitemata Asian	118.4	115.9	120.9	128.7	124.9	132.6
Waitemata European/Other	179.0	178.1	179.9	153.3	152.5	154.2
Auckland Asian	103.1	101.5	104.8	102.8	100.6	105.0
Auckland European/Other	298.2	296.6	299.8	270.8	269.2	272.5

Table 63 Age standardised YLLs, Alzheimer's diseases, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	104.8	101.3	108.2	65.5	62.9	68.1
	Indian	147.1	141.6	152.7	*	*	*
	Other Asian	86.1	82.6	89.6	337.8	325.6	350.0
Auckland	Chinese	120.7	118.4	122.9	55.2	53.4	57.0
	Indian	83.4	80.0	86.7	168.1	163.5	172.7
	Other Asian	76.4	72.8	80.0	105.7	98.4	113.0

* Data not usable

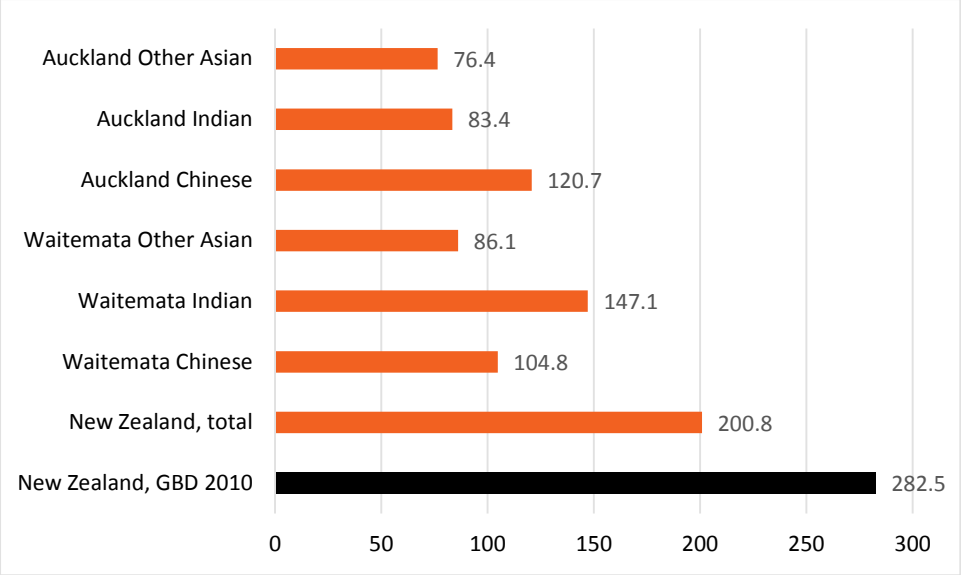


Figure 79 Age standardised YLLs, Alzheimer's diseases, Asian-subgroups, female

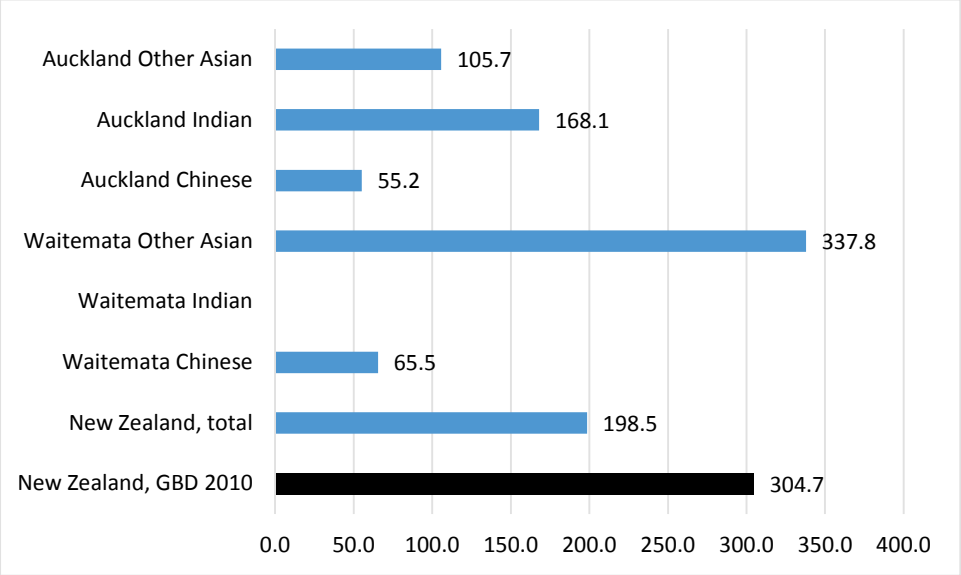


Figure 80 Age standardised YLLs, Alzheimer's diseases, Asian-subgroups, male

Communicable diseases

Hepatitis

Burden of hepatitis at country level, GBD 2010

India and China had the highest mortality rates for hepatitis, while New Zealand had the lowest rate (0.0 per 100,000). This is also true for years of life lost and DALYs. Of note, Australia had the third highest rate of YLLs and DALYs, different from all other high income countries. For the years lived with disability, again, China and India were on the top, while all other countries had comparable rates.

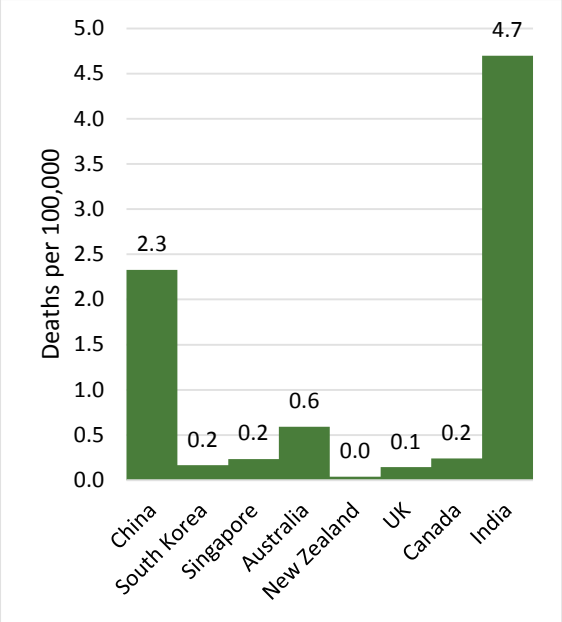


Figure 81 Age standardised mortality rate for hepatitis, both sexes, GBD 2010

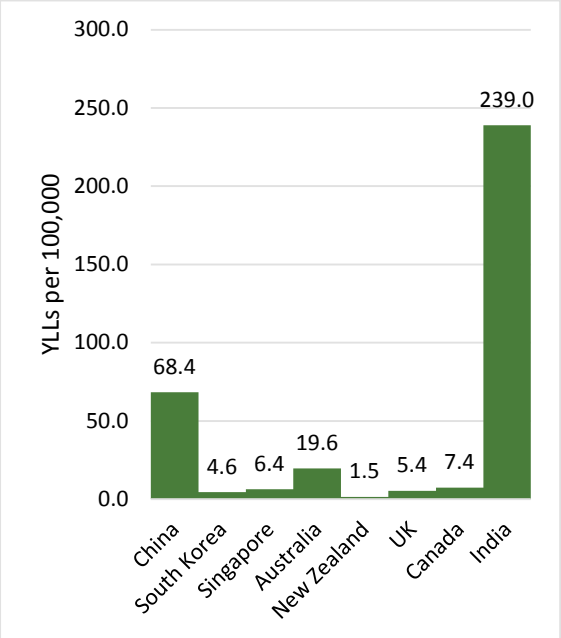


Figure 82 Age standardised YLLs for hepatitis, both sexes, GBD 2010

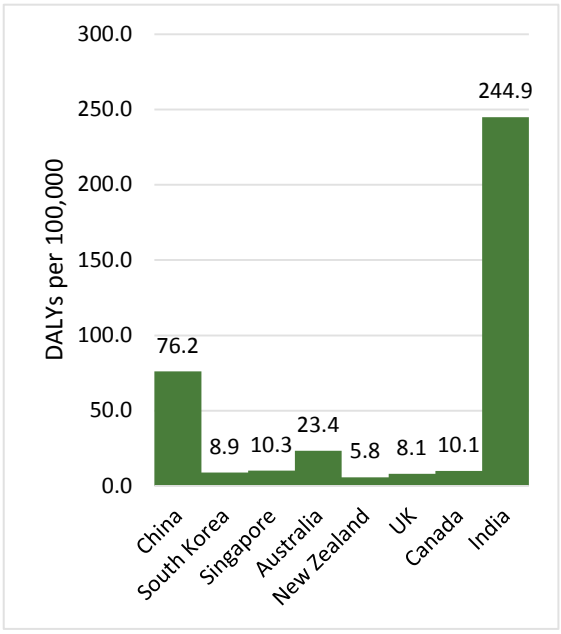


Figure 83 Age standardised DALYs for hepatitis, both sexes, GBD 2010

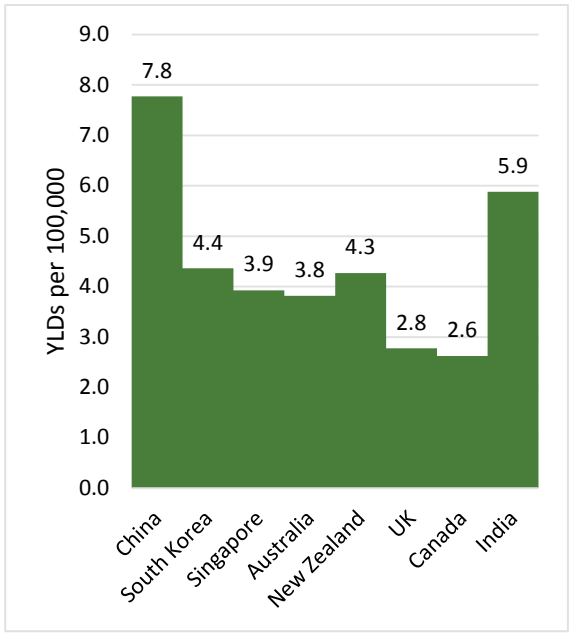


Figure 84 Age standardised YLDs for hepatitis, both sexes, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

In New Zealand, mortality due to hepatitis is rare. In both Waitemata and Auckland DHBs, Asians tended to have higher mortality rates than the New Zealand average. However, as hepatitis death is rare, there were chances of random fluctuations as is observed in **Table 65** and **Table 66**.

Table 64 Age standardised mortality rate, hepatitis, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	0.3	0.3	0.4	0.9	0.7	1.0
Canada	0.2	0.1	0.2	0.3	0.3	0.4
China	1.6	1.4	2.0	3.1	2.7	3.9
India	3.7	3.0	4.9	5.6	4.5	7.3
New Zealand	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
Singapore	0.2	0.1	0.2	0.3	0.3	0.4
Republic of Korea	0.1	0.1	0.2	0.2	0.2	0.2
UK	0.1	0.1	0.1	0.2	0.2	0.2

Table 65 Age standardised mortality rate, hepatitis, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**0.3**	**0.3**	**0.3**	**0.8**	**0.8**	**0.8**
Waitemata Asian	1.1	0.8	1.4	2.2	1.7	2.7
Waitemata European/Other	0.3	0.2	0.3	0.7	0.6	0.9
Auckland Asian	1.0	0.8	1.2	0.0	0.0	0.0
Auckland European/Other	0.2	0.1	0.3	1.7	1.4	1.9

Table 66 Age standardised mortality rate, hepatitis, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	1.9	1.3	2.4	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	0.0	0.0	0.0	7.3	5.6	9.0
Auckland	Chinese	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	7.4	6.1	8.8	0.0	0.0	0.0

YLLs

Asian women in both DHBs would have comparable YLL rates to the high income countries except to Australia according to **Table 67**. Asian men in both DHBs would still be among the best at country level, if years of life lost were shared between Waitemata and Auckland Asian men to minimise the effects of random variation. Other Asian residents tended to have a higher rate of YLLs.

Table 67 Age standardised YLLs, hepatitis, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	10.7	9.0	12.6	28.6	24.9	33.0
Canada	4.8	4.0	5.8	10.1	8.5	12.0
China	42.2	36.6	55.6	94.3	82.0	124.7
India	205.0	157.8	295.9	271.8	211.1	381.0
New Zealand	**1.4**	**1.1**	**1.7**	**1.7**	**1.4**	**2.0**
Singapore	4.3	3.5	5.2	8.5	7.2	10.1
Republic of Korea	3.2	2.7	3.8	5.9	5.0	6.9
UK	3.3	3.1	3.6	7.5	7.0	8.0

Table 68 Age standardised YLLs, hepatitis, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**10.3**	**10.1**	**10.5**	**30.9**	**30.6**	**31.2**
Waitemata Asian	24.3	22.9	25.8	54.0	51.4	56.5
Waitemata European/Other	9.6	9.1	10.1	33.0	32.0	34.1
Auckland Asian	14.2	13.5	14.9	*	*	*
Auckland European/Other	10.6	9.9	11.4	60.8	59.2	62.3

* Data not useable

Table 69 Age standardised YLLs, hepatitis, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	42.9	40.4	45.5	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	0.0	0.0	0.0	181.5	173.0	190.0
Auckland	Chinese	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	106.8	101.7	112.0	0.0	0.0	0.0

Tuberculosis

Burden of tuberculosis at country level, GBD 2010

India had a much higher mortality rate due to tuberculosis and the age standardised rates for years of life lost and DALYs were also the highest in India. New Zealand had comparable low rates for all the four metrics as other high income countries except Korea and Singapore. The rank for YLDs was just like the other three measures of disease burden, but the differences between India and the other three Asian countries were smaller.

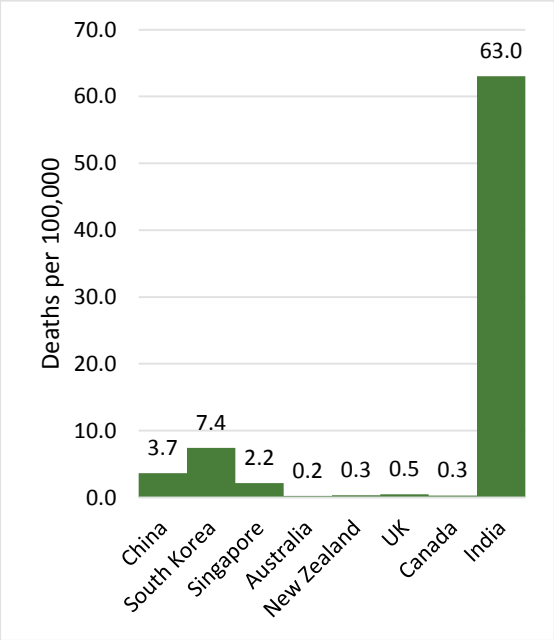


Figure 85 Age standardised mortality rate for tuberculosis, both sexes, GBD 2010

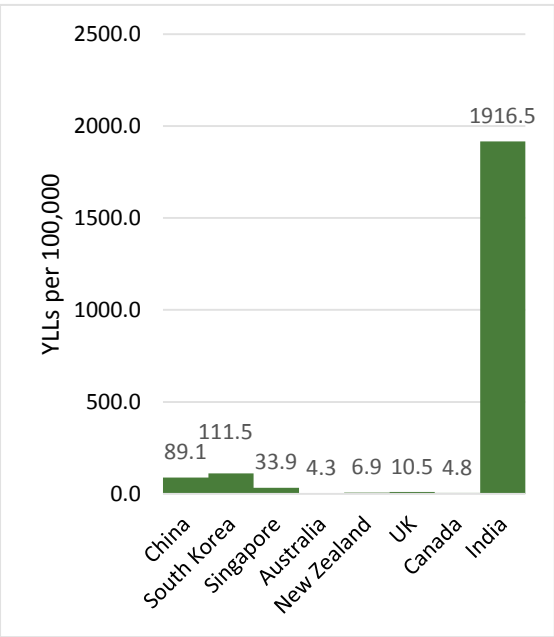


Figure 86 Age standardised YLLs for tuberculosis, both sexes, GBD 2010

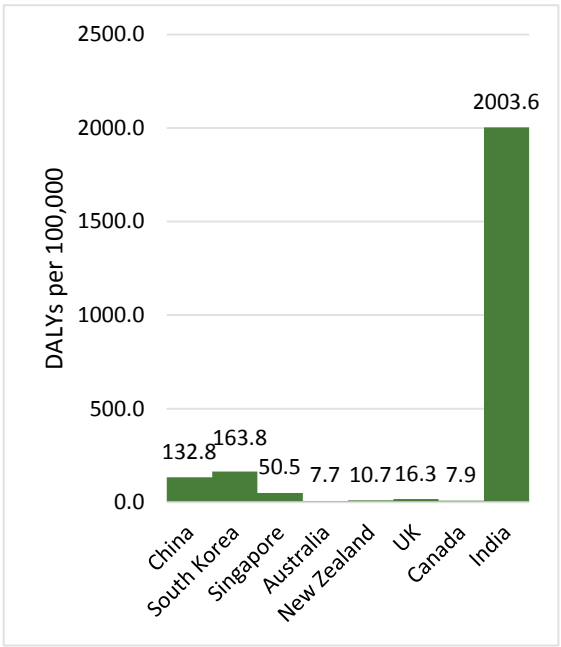


Figure 87 Age standardised DALYs for tuberculosis, both sexes, GBD 2010

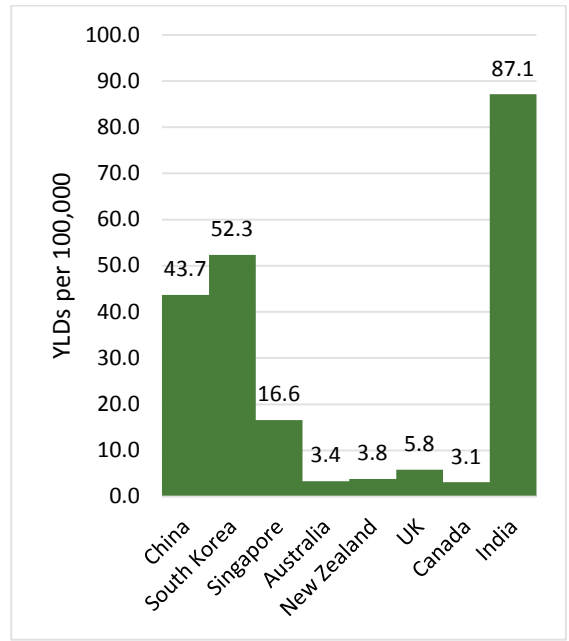


Figure 88 Age standardised YLDs for tuberculosis, both sexes, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

The Asians in both Waitemata and Auckland DHBs had close to 0 mortality rate regardless of sex, which would rank both DHBs at joint first place at country level.

Table 70 Age standardised mortality rate, tuberculosis, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	0.2	0.1	0.2	0.3	0.3	0.4
Canada	0.2	0.2	0.3	0.3	0.3	0.4
China	2.1	1.8	2.3	5.5	4.8	6.2
India	43.2	34	52	87.6	70.8	109.7
New Zealand	**0.3**	**0.2**	**0.4**	**0.4**	**0.3**	**0.5**
Singapore	1.0	0.8	1.3	3.9	3.3	5.2
Republic of Korea	5.0	3.9	6.1	11.8	10.4	14.6
UK	0.4	0.3	0.4	0.6	0.5	0.7

Table 71 Age standardised mortality rate, tuberculosis, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**0.1**	**0.1**	**0.2**	**0.3**	**0.2**	**0.3**
Waitemata Asian	0.0	0.0	0.0	0.0	0.0	0.0
Waitemata European/Other	0.0	0.0	0.0	0.0	0.0	0.0
Auckland Asian	0.0	0.0	0.0	0.0	0.0	0.0
Auckland European/Other	0.2	0.2	0.2	0.3	0.3	0.4

Table 72 Age standardised mortality rate, tuberculosis, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	0.0	0.0	0.0	0.0	0.0	0.0
Auckland	Chinese	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	0.0	0.0	0.0	0.0	0.0	0.0

YLLs

Just like the mortality rate, the Asians in Waitemata and Auckland DHBs had close to 0 YLL rate regardless of sex, which would place them in joint first place at country level according to **Table 73** from the GBD 2010.

Table 73 Age standardised YLLs, tuberculosis, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	3.5	2.6	4.1	5.3	4.5	6.0
Canada	4.0	3.4	4.7	5.7	5.1	6.8
China	52.0	44.8	58.1	127.4	111.0	146.4
India	1390.0	1002.6	1701.3	2443.8	1968.6	3006.2
New Zealand	**6.3**	**5.2**	**7.4**	**7.5**	**6.6**	**9.6**
Singapore	15.7	13.3	18.9	55.8	49.1	69.6
Republic of Korea	59.2	52.1	68.5	179.6	163.0	224.8
UK	8.5	6.8	9.1	12.8	10.8	13.8

Table 74 Age standardised YLLs, tuberculosis, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**3.7**	**3.6**	**3.8**	**7.3**	**7.1**	**7.4**
Waitemata Asian	0.0	0.0	0.0	0.0	0.0	0.0
Waitemata European/Other	0.0	0.0	0.0	0.0	0.0	0.0
Auckland Asian	0.0	0.0	0.0	0.0	0.0	0.0
Auckland European/Other	1.5	1.4	1.5	4.3	4.1	4.5

Table 75 Age standardised YLLs, tuberculosis, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	0.0	0.0	0.0	0.0	0.0	0.0
Auckland	Chinese	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	0.0	0.0	0.0	0.0	0.0	0.0

Injuries

Transport injuries

Burden of transport injuries at country level, GBD 2010

India and China had the highest mortality rate of transport injuries for females and males, followed by the Republic of Korea. Singapore and the UK were both leading. For DALYs, again, India and China had the highest burden, whereas Singapore and the UK did the best. New Zealand had a comparable DALY rate to Canada and the Republic of Korea and Australia did slightly better than New Zealand. The distribution of YLLs by country was the same as for DALYs. India led as the one with the largest YLDs compared to the list, with China and Canada ranked equally second.

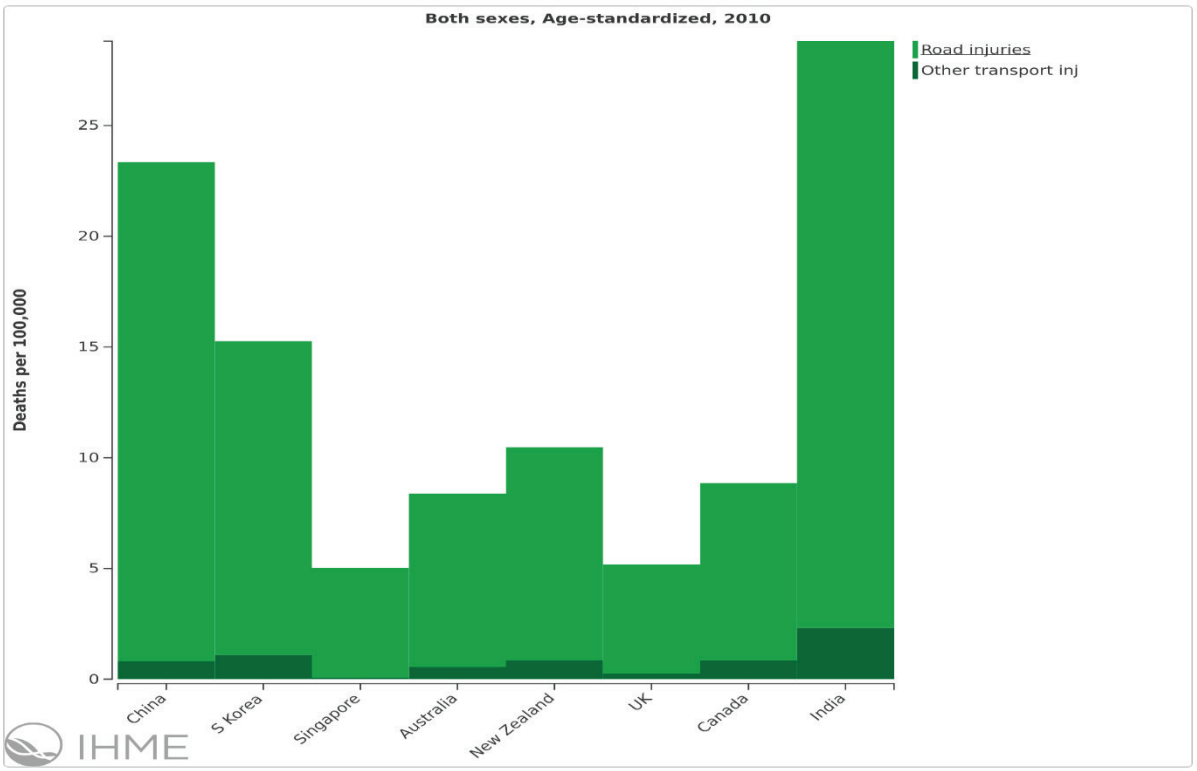


Figure 89 Age standardised mortality rate for transport injuries, both sexes, GBD 2010

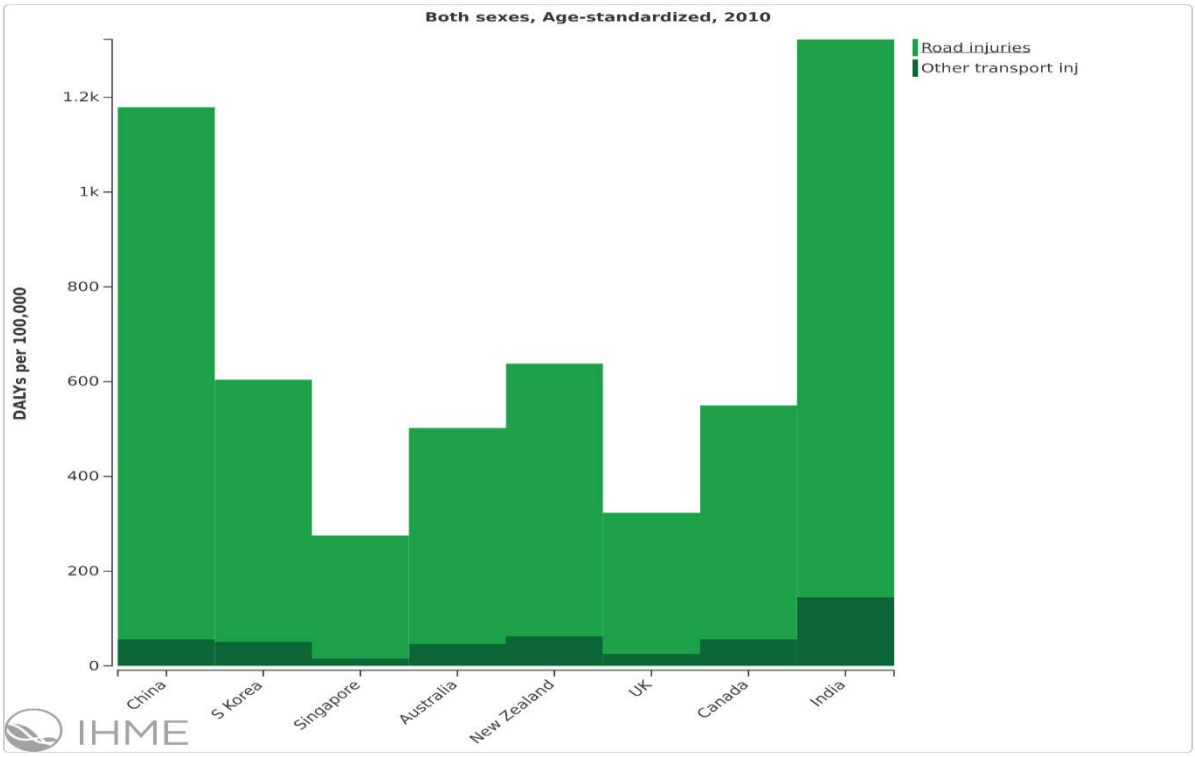


Figure 90 Age standardised DALYs for transport injuries, both sexes, GBD 2010

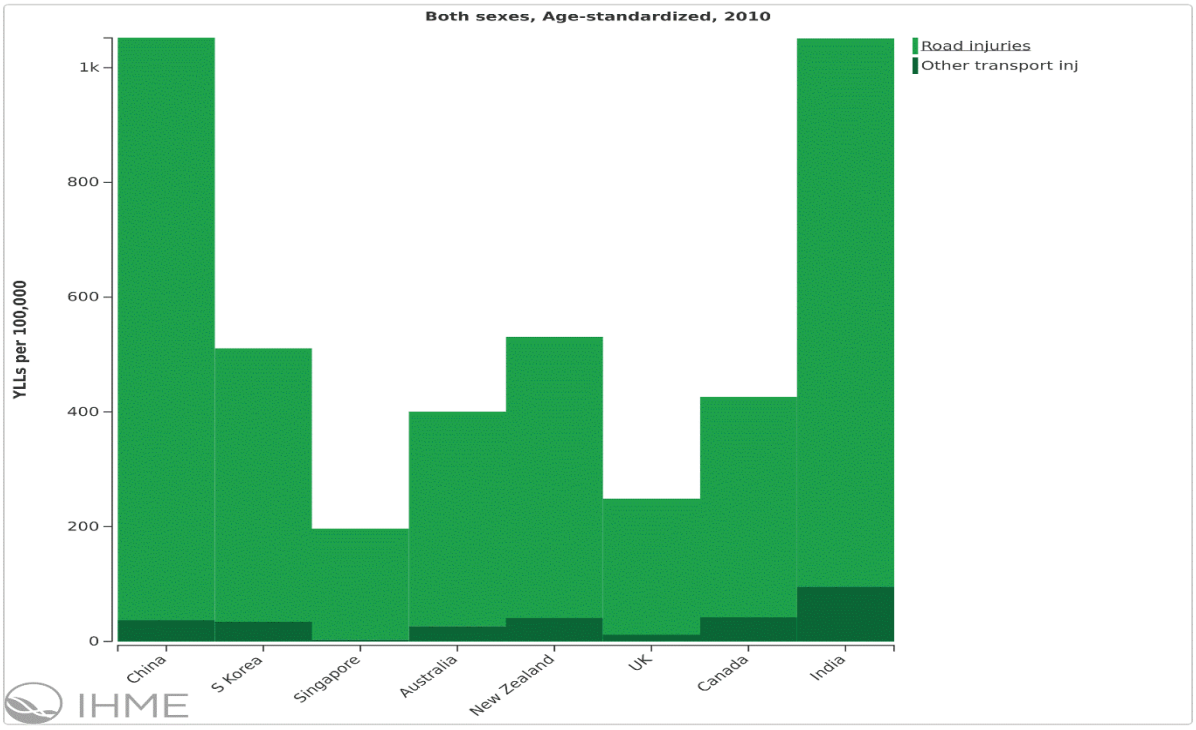


Figure 91 Age standardised YLLs for transport injuries, both sexes, GBD 2010

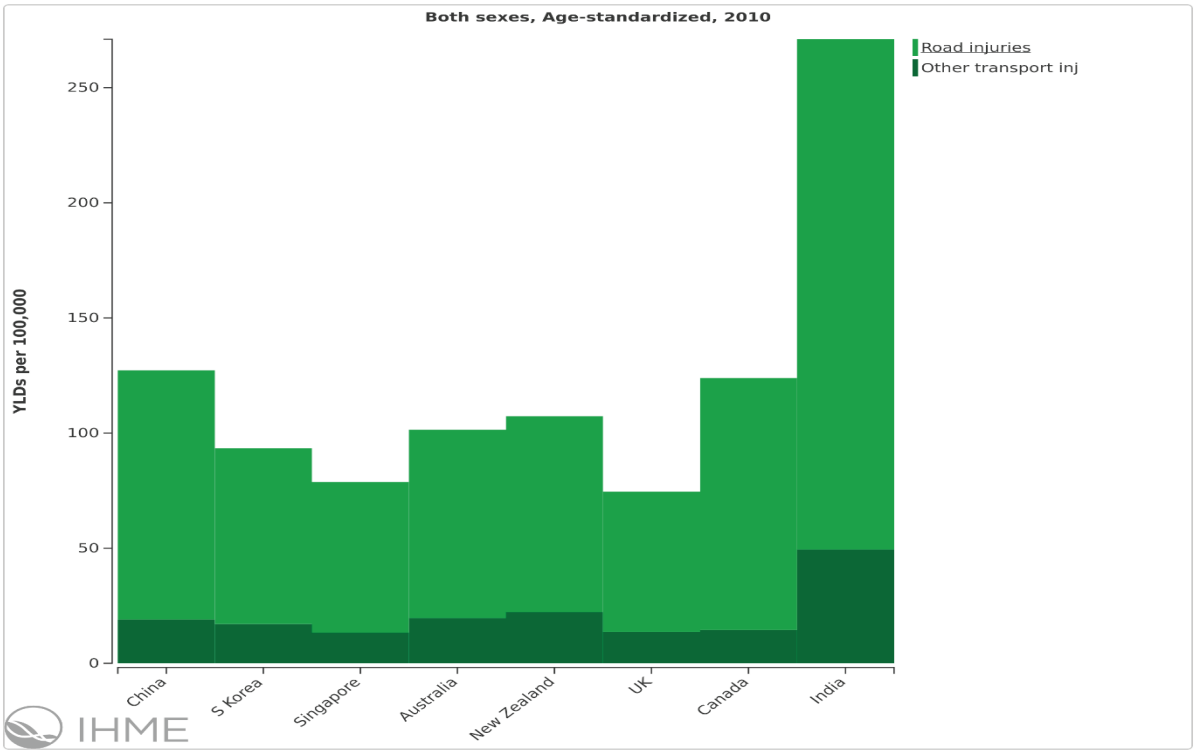


Figure 92 Age standardised YLDs for transport injuries, both sexes, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

Although there was some level of uncertainty due to small numbers, Asians in Auckland and Waitemata DHBs tended to be the best at the country level for both women and men. Asian men had a higher risk of death due to transport injuries than Asian women. There may also be variations within Asian sub-groups.

Table 76 Age standardised mortality rate, transport injuries, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	4.5	4.1	6	12.3	11.4	12.9
Canada	5.3	4.7	6.7	12.5	11.6	13.3
China	12	10	13.3	34.5	28.6	38.1
India	16.3	11.2	19.7	41.2	32.5	49.5
New Zealand	**6.4**	**5.5**	**7.7**	**14.7**	**13.6**	**15.9**
Singapore	2	1.7	2.7	8.3	7.6	8.9
Republic of Korea	8.2	6.8	10.9	23.3	21.8	25.0
UK	2.4	2.1	3.0	8.0	7.7	8.3

Table 77 Age standardised mortality rate, transport injuries, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**4.2**	**4.0**	**4.3**	**11.8**	**11.6**	**12.0**
Waitemata Asian	0.0	0.0	0.0	2.5	2.0	2.9
Waitemata European/Other	2.7	2.3	3.1	5.2	4.6	5.8
Auckland Asian	0.7	0.3	1.0	3.9	3.4	4.5
Auckland European/Other	0.8	0.5	1.0	6.5	5.7	7.2

Table 78 Age standardised mortality rate, transport injuries, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	0.0	0.0	0.0	2.7	2.2	3.2
	Indian	0.0	0.0	0.0	3.8	2.4	5.2
	Other Asian	0.0	0.0	0.0	0.0	0.0	0.0
Auckland	Chinese	1.5	0.7	2.3	3.3	2.7	3.9
	Indian	0.0	0.0	0.0	1.3	0.7	1.9
	Other Asian	0.0	0.0	0.0	7.2	5.3	9.2

YLLs

Asian women and men in both DHBs were likely to be at the level of Singapore or the UK for years of life lost although there may be variations by Asian sub-group. Asian men had more years of life lost than Asian women in both DHBs, similar to all others at the country level.

Table 79 Age standardised YLLs, transport injuries, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	208.5	190.5	279.0	588.4	533.7	623.1
Canada	252.2	225.7	314.2	596.5	541.9	637.8
China	519.0	422.2	562.4	1561.5	1300.7	1729.2
India	524.8	376.1	631.2	1549.9	1239.9	1890.6
New Zealand	**315.2**	**274.4**	**374.4**	**749.2**	**684.7**	**815.7**
Singapore	65.9	51.4	82.2	331.5	299.4	357.2
Republic of Korea	245.7	216.2	340.1	781.4	726.1	837.7
UK	107.7	93.0	130.7	389.3	370.1	404.3

Table 80 Age standardised YLLs, transport injuries, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**228.2**	**227.2**	**229.3**	**674.9**	**673.1**	**676.8**
Waitemata Asian	0.0	0.0	0.0	48.3	46.2	50.3
Waitemata European/Other	150.9	147.6	154.3	319.5	314.7	324.4
Auckland Asian	50.2	46.9	53.4	156.5	152.4	160.6
Auckland European/Other	44.1	42.1	46.1	378.9	372.9	384.8

Table 81 Age standardised YLLs, transport injuries, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	0.0	0.0	0.0	35.0	33.2	36.8
	Indian	0.0	0.0	0.0	123.8	115.7	131.8
	Other Asian	0.0	0.0	0.0	0.0	0.0	0.0
Auckland	Chinese	111.4	104.2	118.6	82.7	78.8	86.5
	Indian	0.0	0.0	0.0	93.4	88.2	98.6
	Other Asian	0.0	0.0	0.0	334.0	320.9	347.0

Unintentional injuries

Burden of unintentional injuries at country level, GBD 2010

India had the highest mortality rate for other unintentional injuries, followed by China and the Republic of Korea, while Singapore led followed by New Zealand. India and China had the highest burden of injuries measured by DALYs as well. New Zealand had a comparable DALY rate to other countries except Singapore, which was also similar with the distribution of years of life lost. The UK had a heavy burden of YLDs followed by India, while China had the lowest rate of years lived with disability. New Zealand had a similar burden of YLDs as compared to other countries except the UK, India and China.

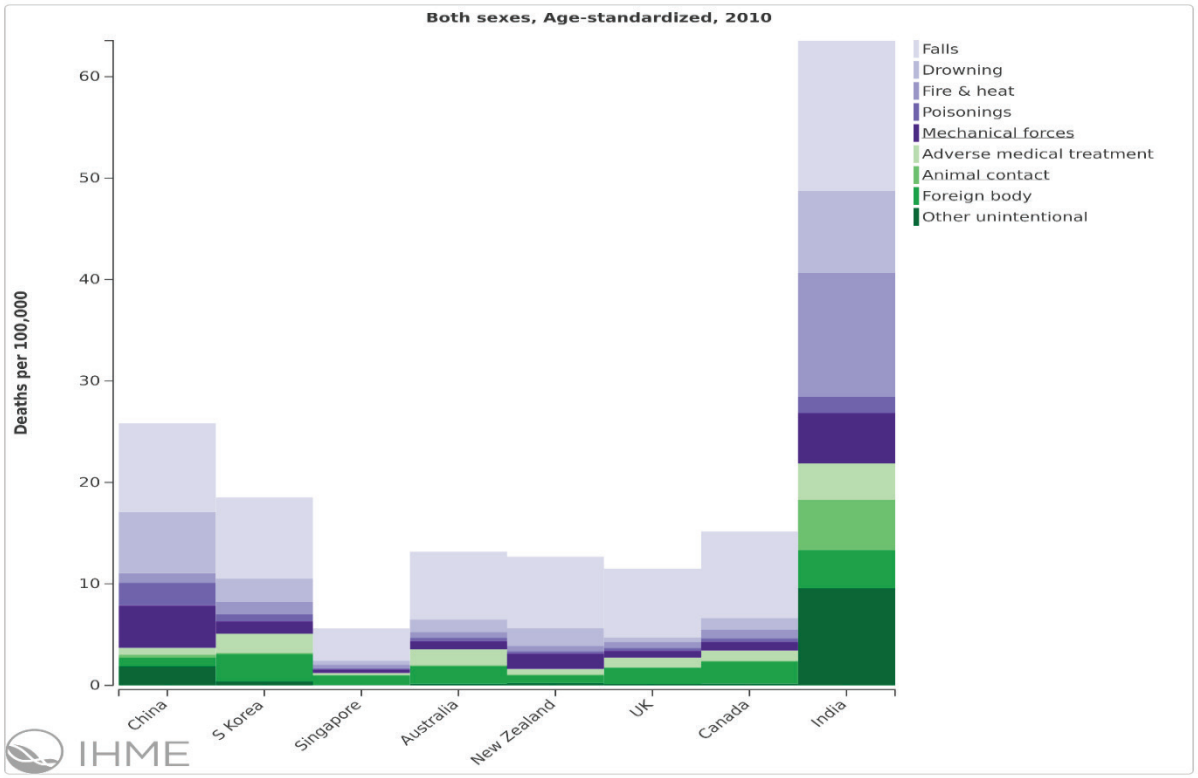


Figure 93 Age standardised mortality rate for unintentional injuries, both sexes, GBD 2010

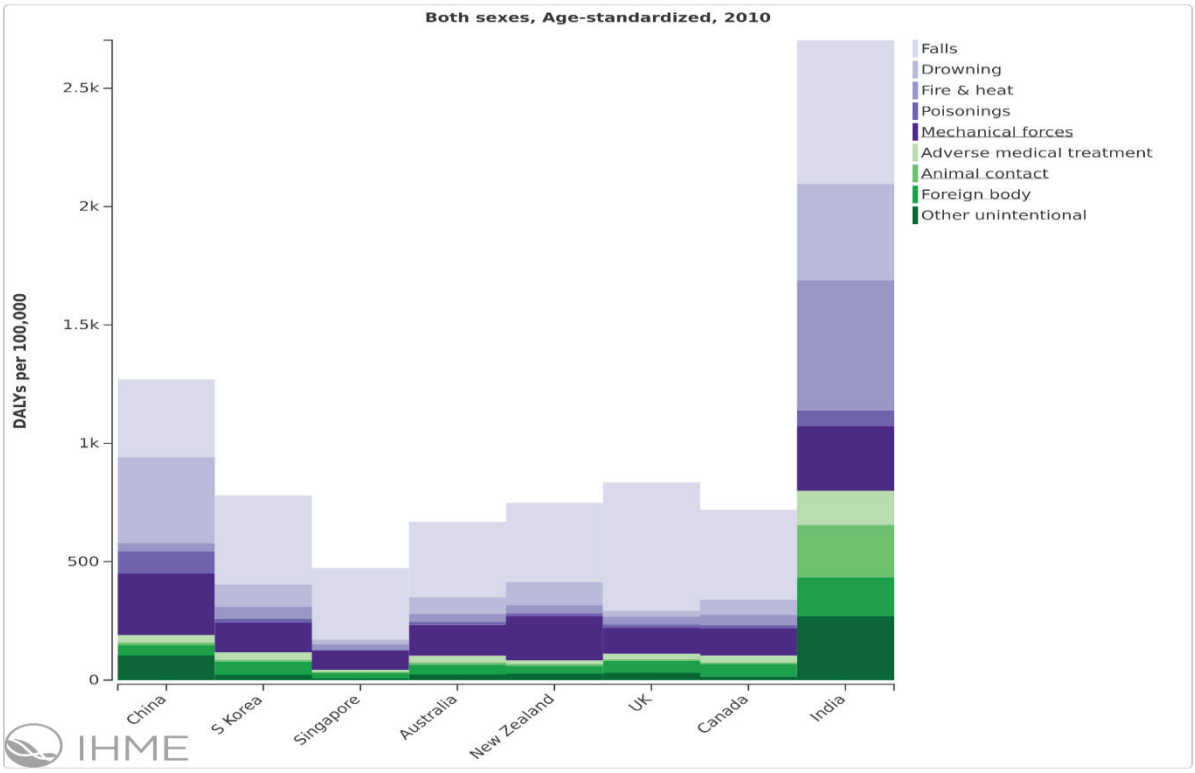


Figure 94 Age standardised DALYs for unintentional injuries, both sexes, GBD 2010

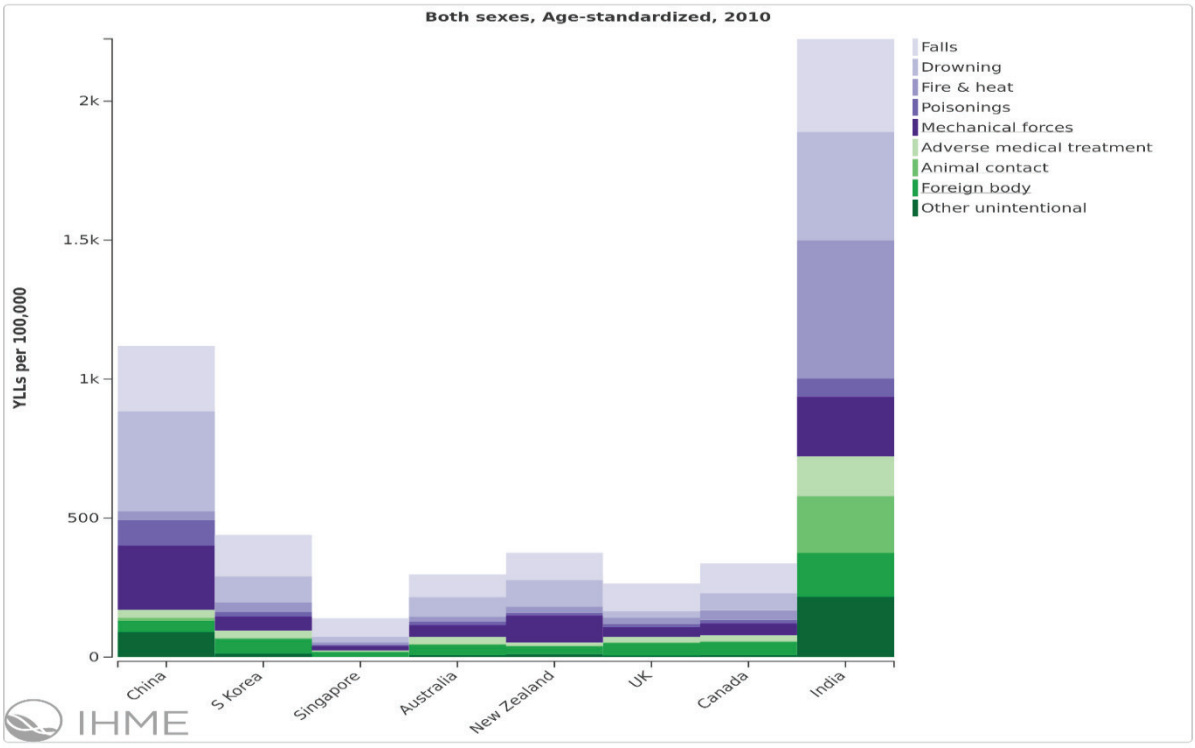


Figure 95 Age standardised YLLs for unintentional injuries, both sexes, GBD 2010

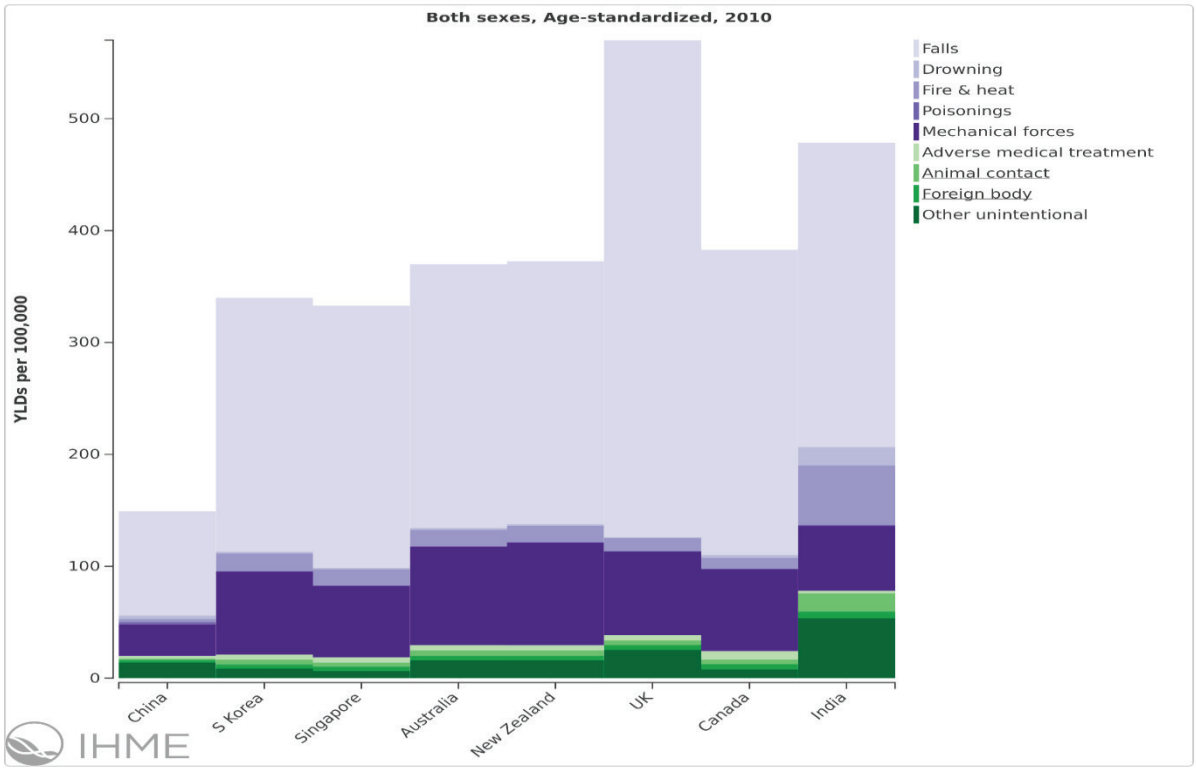


Figure 96 Age standardised YLDs for unintentional injuries, both sexes, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

For Asians in both DHBs, the mortality rates were roughly 35%-77% of the New Zealand average, which places the Asian residents of the two DHBs at a comparable standing to Singapore for both women and men. The small numbers prevented exploring the variations by Asian sub-group, as the variation over time has not been taken into account.

Table 82 Age standardised mortality rate, unintentional injuries, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	10.5	7.6	12.3	16.1	12.3	18.2
Canada	12.2	9.4	14.4	18.3	15.1	20.7
China	17.8	15.4	20.5	33.6	28.9	36.7
India	61.9	51.9	73.1	64.6	54.8	76.6
New Zealand	**9.4**	**7.5**	**11.5**	**16**	**13.4**	**17.9**
Singapore	3.5	2.6	4.2	8.1	6.4	9.3
Republic of Korea	12.7	7.7	15.8	25.3	19.2	28.0
UK	9.6	7.5	10.5	13.4	10.8	14.4

Table 83 Age standardised mortality rate, unintentional injuries, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**10.1**	**9.9**	**10.2**	**17.9**	**17.7**	**18.1**
Waitemata Asian	7.8	7.0	8.5	6.4	5.4	7.4
Waitemata European/Other	6.0	5.6	6.4	12.0	11.4	12.6
Auckland Asian	3.6	3.1	4.0	8.0	7.2	8.8
Auckland European/Other	9.3	8.9	9.8	14.0	13.2	14.8

Table 84 Age standardised mortality rate, unintentional injuries, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	7.5	6.5	8.5	9.9	7.9	11.9
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	11.7	10.3	13.1	4.4	2.9	5.8
Auckland	Chinese	3.9	3.3	4.6	2.5	1.9	3.2
	Indian	3.0	2.5	3.4	18.7	16.7	20.6
	Other Asian	1.2	0.5	1.9	8.2	5.9	10.6

YLLs

The point standardised rate ratio of Asians ranged between 21%-45% for the two DHBs relative to the New Zealand average. As for the mortality rate, the two DHBs' Asian rated as well as Singaporeans at the country level. In general, Asian men had a higher level of YLLs than women in both DHBs.

Table 85 Age standardised YLLs, unintentional injuries, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	188.7	157.5	206.5	409.1	361.4	453.8
Canada	213.3	187.9	242.0	462.3	418.3	537.2
China	702.8	635.4	869.5	1514.8	1343.3	1696.2
India	2104.1	1756.1	2548.6	2333.1	1970.1	2761.5
New Zealand	**206.5**	**169.9**	**239.6**	**548.1**	**465.3**	**634.4**
Singapore	73.0	57.9	84.9	212.2	175.4	238.4
Republic of Korea	228.5	184.3	259.1	661.2	571.3	822.5
UK	173.2	148.5	189.4	357.4	314.1	384.8

Table 86 Age standardised YLLs, unintentional injuries, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**350.5**	**349.3**	**351.7**	**752.3**	**750.5**	**754.1**
Waitemata Asian	157.2	152.2	162.1	261.4	254.3	268.5
Waitemata European/Other	190.0	186.5	193.5	443.7	439.0	448.3
Auckland Asian	73.1	70.8	75.5	215.6	210.1	221.0
Auckland European/Other	205.1	202.3	208.0	523.8	517.1	530.4

Table 87 Age standardised YLLs, unintentional injuries, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	148.4	142.4	154.5	452.9	437.4	468.4
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	209.0	200.2	217.7	198.6	188.6	208.5
Auckland	Chinese	76.2	73.3	79.0	71.8	68.1	75.5
	Indian	11.0	10.1	11.9	468.2	453.7	482.6
	Other Asian	85.7	80.1	91.3	190.9	179.5	202.2

Self-harm and interpersonal violence

Burden of self-harm and interpersonal violence at country level, GBD 2010

India and the Republic of Korea had the highest mortality rate due to intentional injuries. New Zealand was relatively high as were other countries except for the UK which was the leading country. However, New Zealand had a higher burden of the total fatal and non-fatal health loss, as compared to China, Singapore and the UK. India and the Republic of Korea had the highest DALY rate. The YLL rate followed a similar distribution by country to the DALYs. Canada surpassed India in the burden of YLDs and all other countries were relatively close to each other. The higher rates of interpersonal violence contributed significantly to the heavy burden of the two countries, namely Canada (interpersonal violence: 16 per 100,000, 95%UI: 11, 21) and India (interpersonal violence: 16 per 100,000, 95%UI: 12, 21).

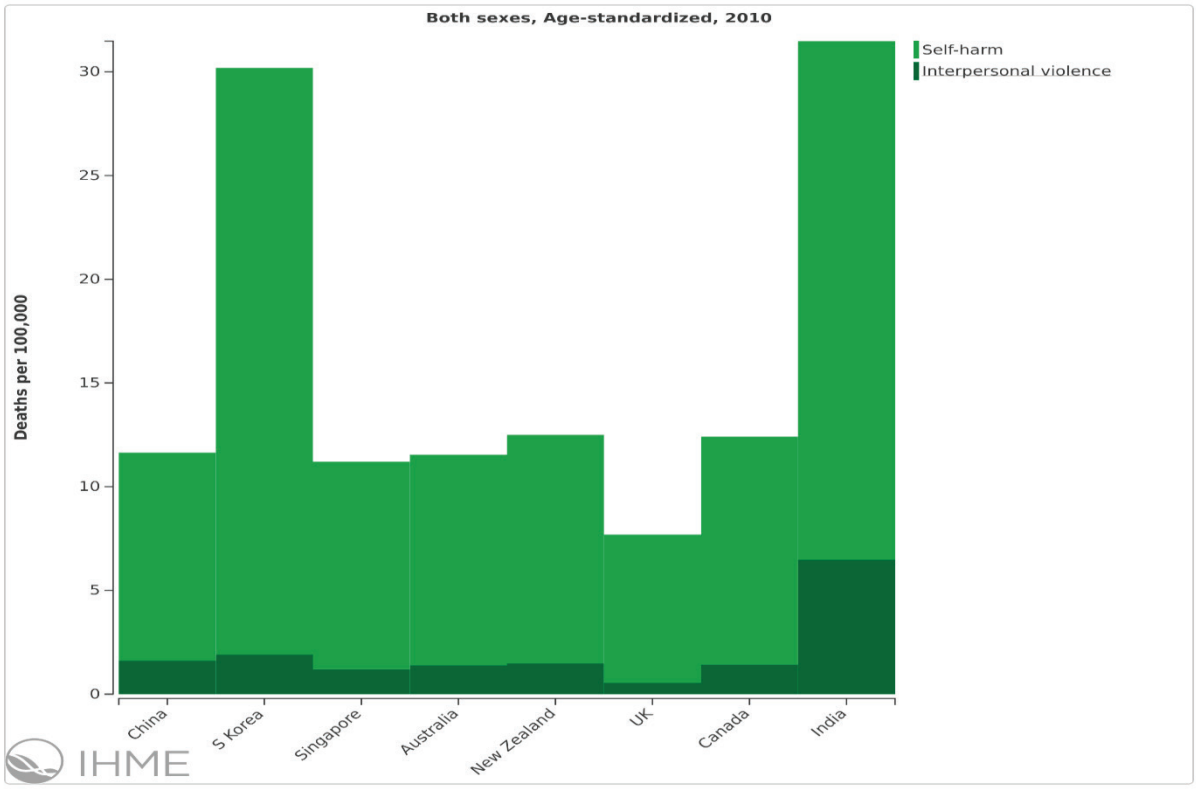


Figure 97 Age standardised mortality rate for self-harm and interpersonal violence, both sexes, GBD 2010

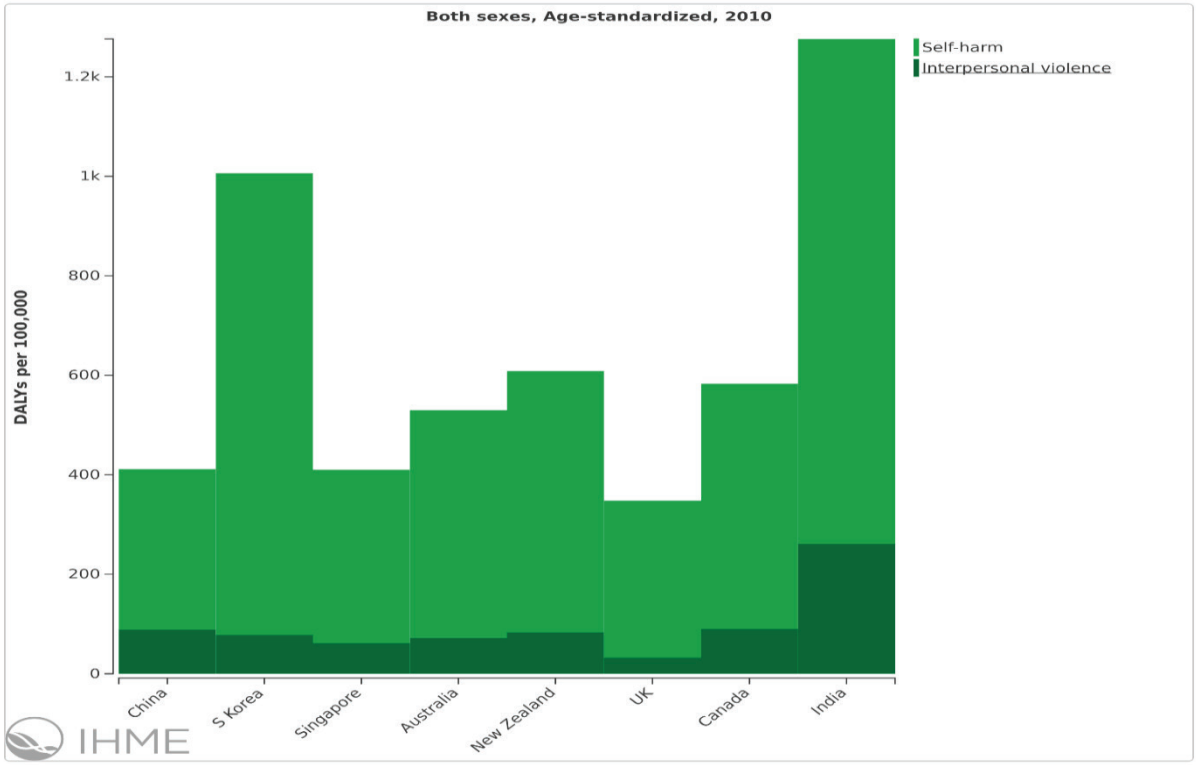


Figure 98 Age standardised DALYs for self-harm and interpersonal violence, both sexes, GBD 2010

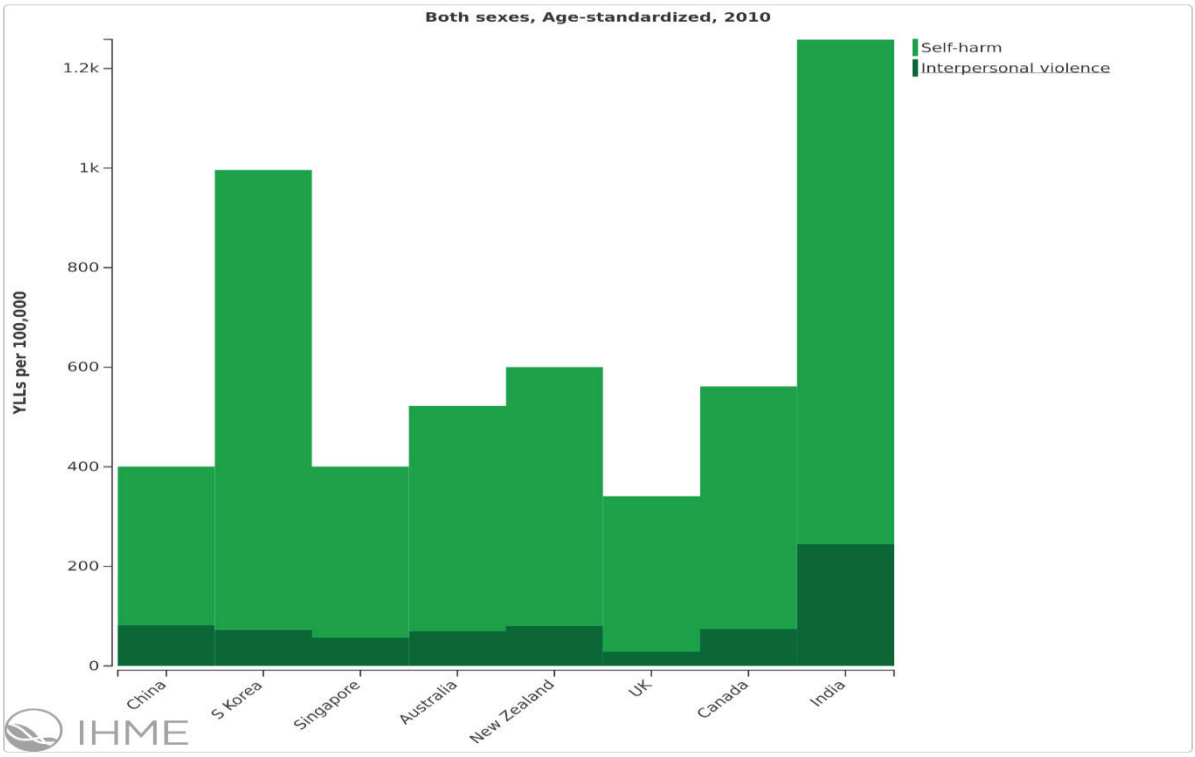


Figure 99 Age standardised YLLs for self-harm and interpersonal violence, both sexes, GBD 2010

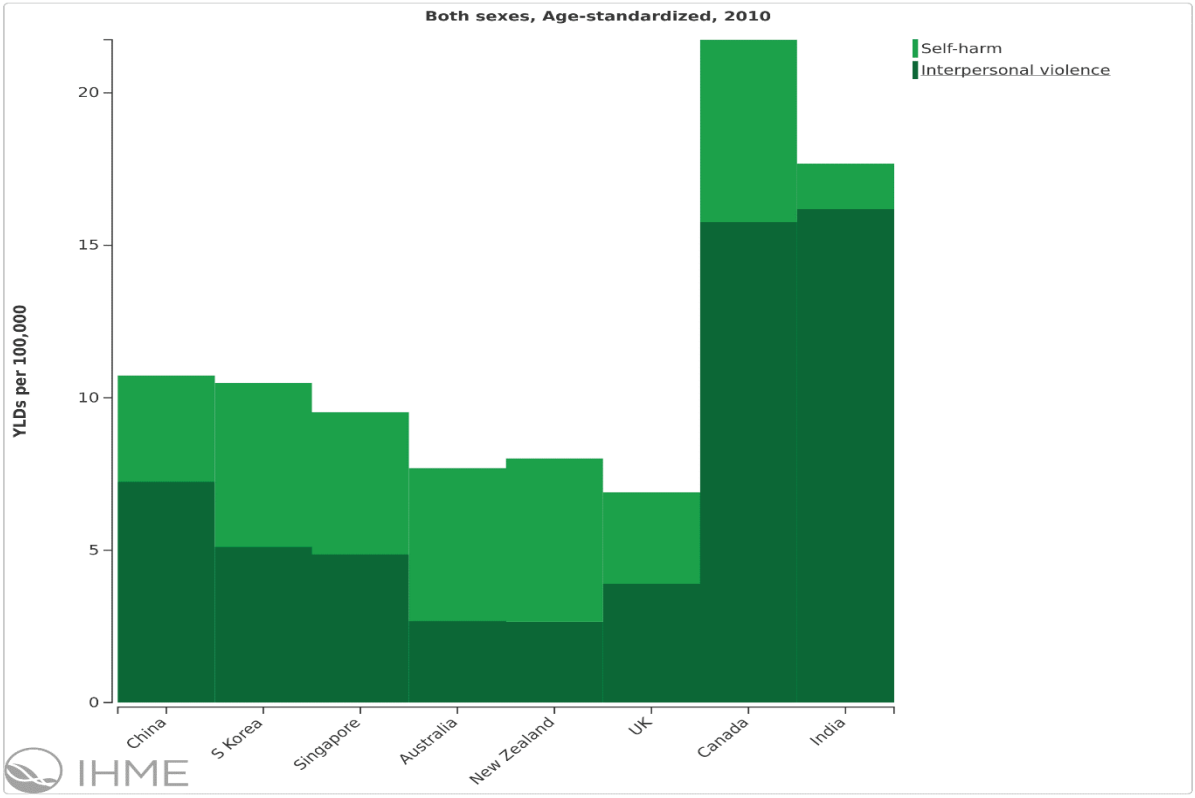


Figure 100 Age standardised YLDs for self-harm and interpersonal violence, both sexes, GBD 2010

Among youth, New Zealand had high mortality and DALY rates for intentional injuries just behind India, particularly for males. It was true for both 15-19 and 20-24 years old. The UK, China and Singapore had better performance within these two age groups.

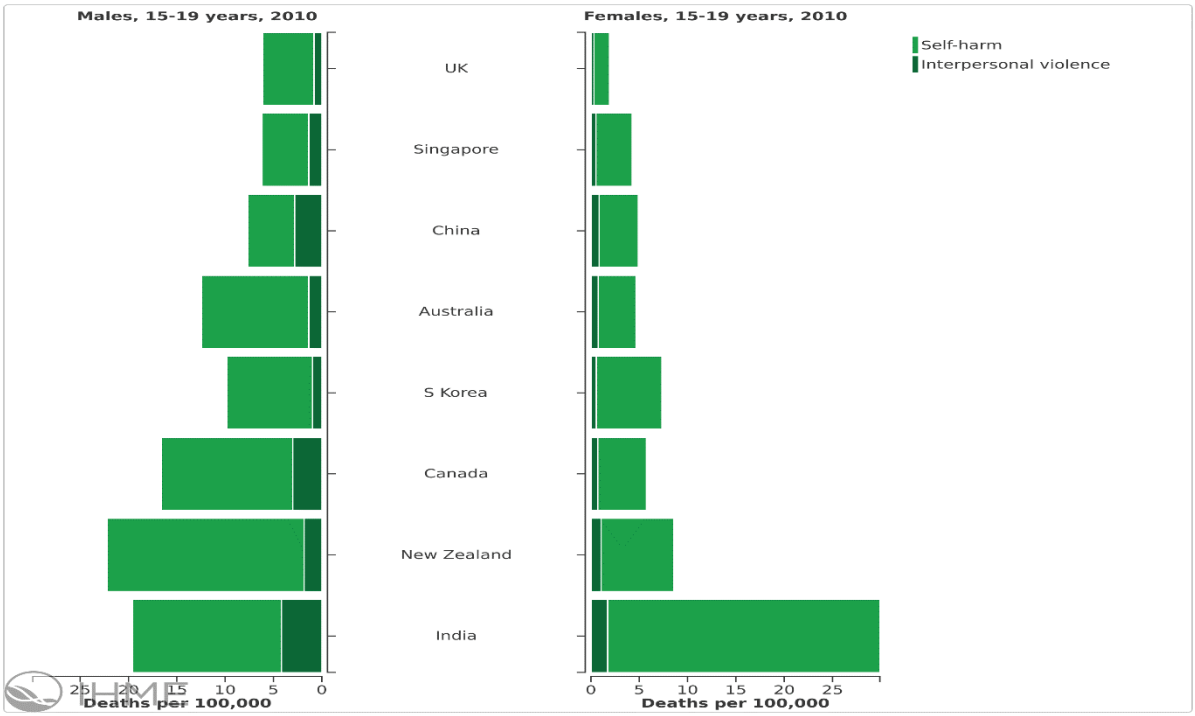


Figure 101 Mortality rate of self-harm and interpersonal violence, by sex, 15-19 yrs, GBD 2010

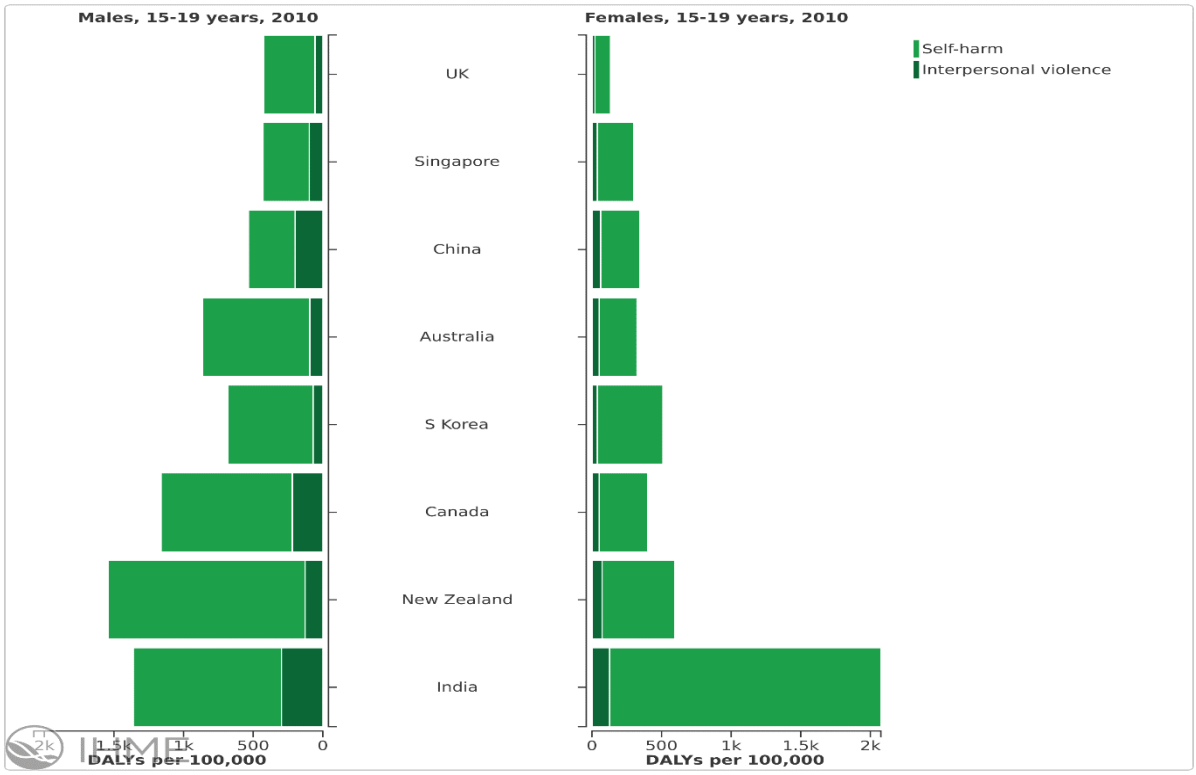


Figure 102 DALY rate of self-harm and interpersonal violence, by sex, 15-19 yrs, GBD 2010

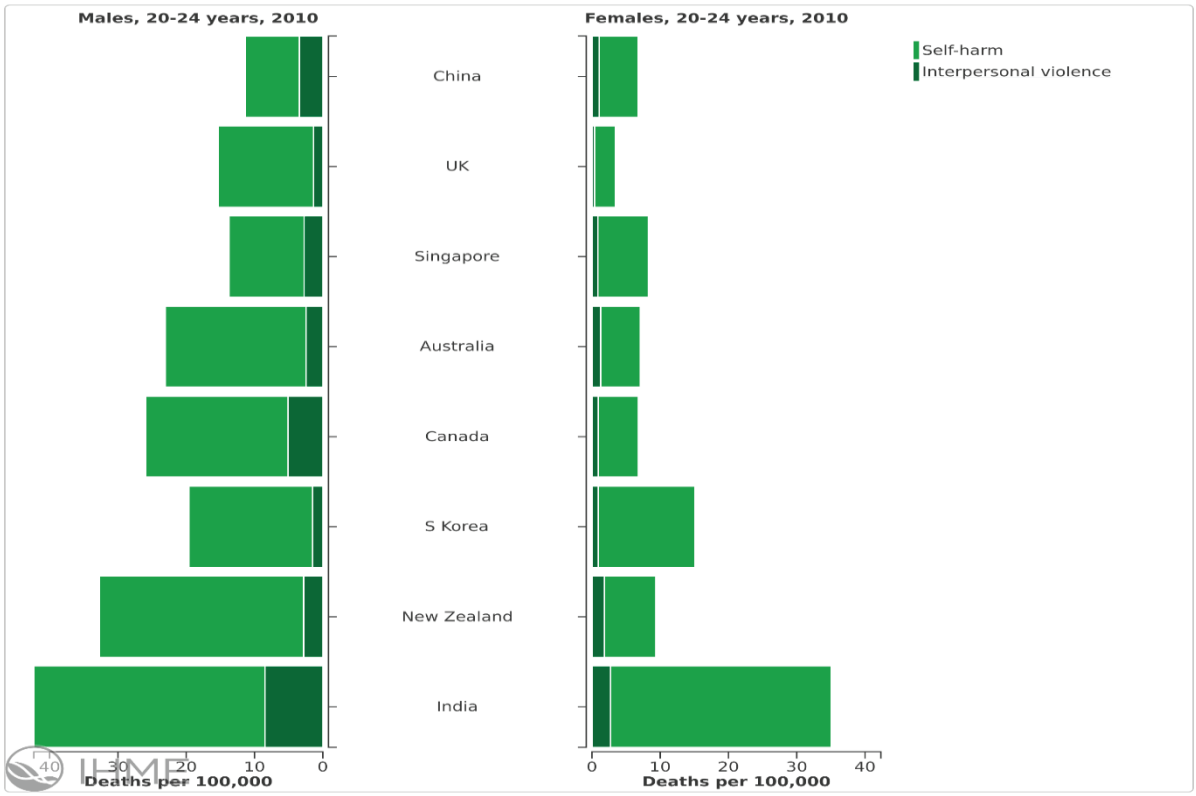


Figure 103 Mortality rate of self-harm and interpersonal violence, by sex, 20-24 yrs, GBD 2010

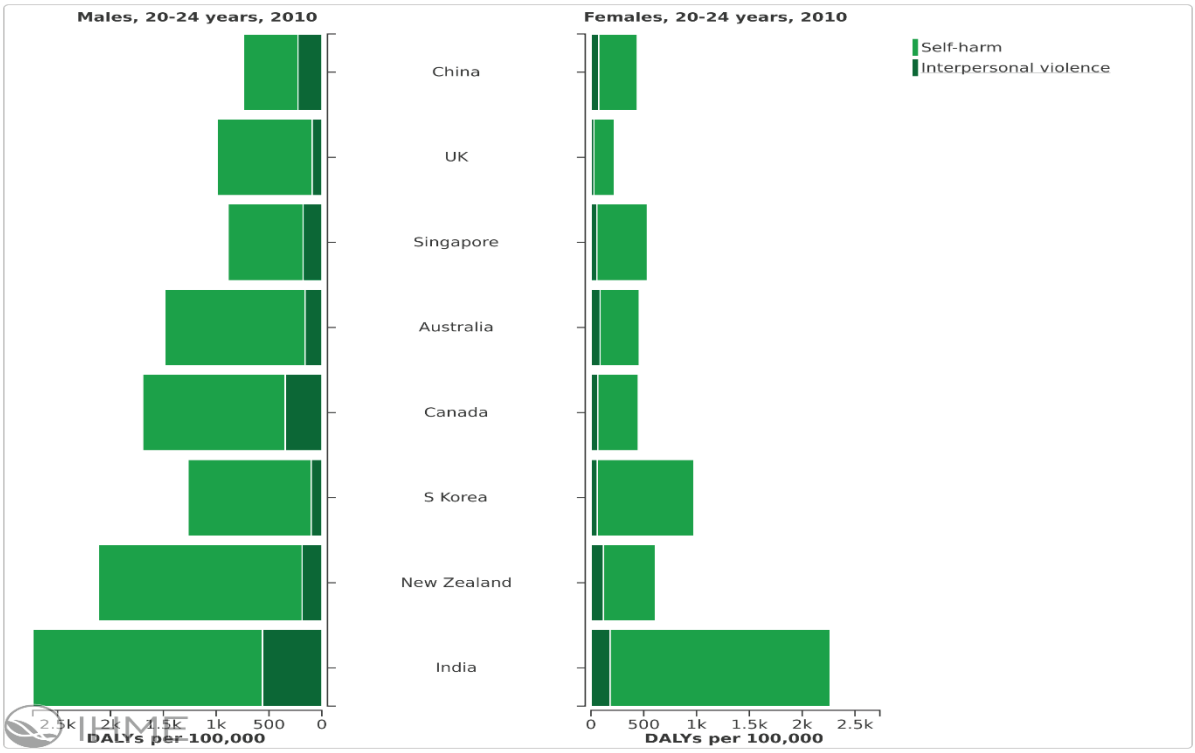


Figure 104 DALY rate of self-harm and interpersonal violence, by sex, 20-24 yrs, GBD 2010

Comparison with Asians in Waitemata and Auckland DHBs

Mortality rate

Asian residents in both DHBs were likely to be among the best at the country level, that is, close to the UK and Australia for women, and close to the UK and China for men, given their standardised rate ratio being 24%-65% relative to the New Zealand averages. No attempts were made to look at the variations by Asian sub-group due to the small numbers.

Table 88 Age standardised mortality rate, intentional injuries, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	5.6	4.6	6.0	17.7	14.5	19.8
Canada	6.0	5.3	6.6	19.0	16.2	22.3
China	9.9	8.9	13.6	13.5	12	19.5
India	22.7	16.6	28.6	40.4	25.2	50.5
New Zealand	**6.2**	**5**	**6.8**	**19.1**	**15.2**	**21.2**
Singapore	7.4	6.6	9.6	15.5	13.2	19.7
Republic of Korea	19.5	8.7	21.9	43.1	18.3	48.8
UK	3.6	3.3	4.2	12.0	10.8	14.6

Table 89 Age standardised mortality rate, intentional injuries, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**7.3**	**7.1**	**7.5**	**19.8**	**19.5**	**20.1**
Waitemata Asian	4.7	4.1	5.4	7.7	6.6	8.9
Waitemata European/Other	3.5	3.0	3.9	16.0	15.1	17.0
Auckland Asian	3.8	3.1	4.5	4.7	4.0	5.5
Auckland European/Other	5.3	4.7	5.8	14.4	13.3	15.4

Table 90 Age standardised mortality rate, intentional injuries, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	2.1	1.6	2.6	5.4	3.9	6.9
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	10.6	8.9	12.2	16.7	13.8	19.7
Auckland	Chinese	4.2	3.2	5.3	4.7	3.4	6.0
	Indian	0.0	0.0	0.0	8.1	6.5	9.7
	Other Asian	5.7	3.8	7.6	0.0	0.0	0.0

YLLs

Similar to the mortality rate pattern, Asian residents in both DHBs were likely to be also leading at the country level, given their standardised rate ratio being 24%-48% relative to the New Zealand averages.

Table 91 Age standardised YLLs, intentional injuries, by sex, GBD 2010

Country	Female			Male		
	Rate	95% UI		Rate	95% UI	
Australia	252.6	209.4	272.0	789.7	660.1	869.5
Canada	269.8	236.9	298.5	849.2	725.2	1010.8
China	336.2	298.4	460.9	466.9	409.0	675.0
India	958.7	701.1	1237.8	1548.8	1000.9	1950.3
New Zealand	**301.6**	**239.5**	**330.9**	**908.1**	**713.7**	**1008.6**
Singapore	260.5	234.5	308.7	548.2	449.6	663.3
Republic of Korea	654.6	319.6	720.3	1359.9	626.3	1516.8
UK	150.6	139.0	174.3	533.7	489.0	646.0

Table 92 Age standardised YLLs, intentional injuries, by sex, Asian and Other, New Zealand, 2010-12

DHB and Ethnicity	Female			Male		
	Rate	95% CI		Rate	95% CI	
New Zealand	**431.2**	**429.8**	**432.7**	**1110.0**	**1107.7**	**1112.3**
Waitemata Asian	120.0	116.4	123.6	401.3	392.9	409.7
Waitemata European/Other	186.1	182.6	189.5	871.1	863.6	878.7
Auckland Asian	207.7	201.7	213.8	263.8	258.1	269.5
Auckland European/Other	259.8	255.5	264.0	765.5	757.7	773.4

Table 93 Age standardised YLLs, intentional injuries, by sex, Asian sub-groups, Waitemata and Auckland DHBs, 2010-12

DHB	Asian sub-group	Female			Male		
		Rate	95% CI		Rate	95% CI	
Waitemata	Chinese	39.1	37.0	41.3	249.6	239.6	259.6
	Indian	0.0	0.0	0.0	0.0	0.0	0.0
	Other Asian	294.5	283.9	305.1	900.1	877.8	922.4
Auckland	Chinese	184.0	176.0	192.0	208.1	199.3	216.9
	Indian	0.0	0.0	0.0	509.3	496.8	521.9
	Other Asian	417.1	400.7	433.4	0.0	0.0	0.0

Maternal and infant health

Maternal

Using the GBD 2013 definitions and estimation methods, the table below provides the MMR with their 95% uncertainty intervals. India is clearly an outlier with much higher MMR than all other countries on the list. Singapore and Korea were leaders, followed by the UK and Canada. New Zealand had a rate comparable to Korea and better than China. However, the reduction of MMR over the 10 years between 2003 and 2013 saw New Zealand only made a 0.1% annualised reduction, while China and Singapore made a 13.2% and 6.8% annualised reduction in MMR respectively.

Table 94 Maternal mortality ratio (per 100,000 livebirths, 95% uncertainty level) by country, GBD 2013

Country	2003	2013	Annualized rate of change in MMR
Australia	5.1 (4.4, 6.0)	4.8 (3.7, 5.9)	-0.7%
Canada	9.2 (7.6, 10.7)	8.2 (6.3, 10.3)	-1.2%
China	64.1 (58.2, 70.1)	17.2 (14.0, 20.3)	-13.2%
India	382.0 (315.3, 472.8)	281.8 (207.0, 371.2)	-3.1%
New Zealand	**9.4 (7.9, 11.3)**	**9.3 (7.2, 12.1)**	**-0.1%**
Singapore	8.8 (7.2, 10.8)	4.5 (3.4, 5.8)	-6.8%
South Korea	15.4 (12.8, 19.0)	12.0 (8.7, 16.7)	-2.6%
UK	7.7 (7·0 to 8·3)	6.1 (5·2 to 6·9)	-2.4%

Source: Global, regional, and national levels and causes of maternal mortality during 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013, Kassebaum, Nicholas J et al. The Lancet, Volume 384, Issue 9947, 980-1004

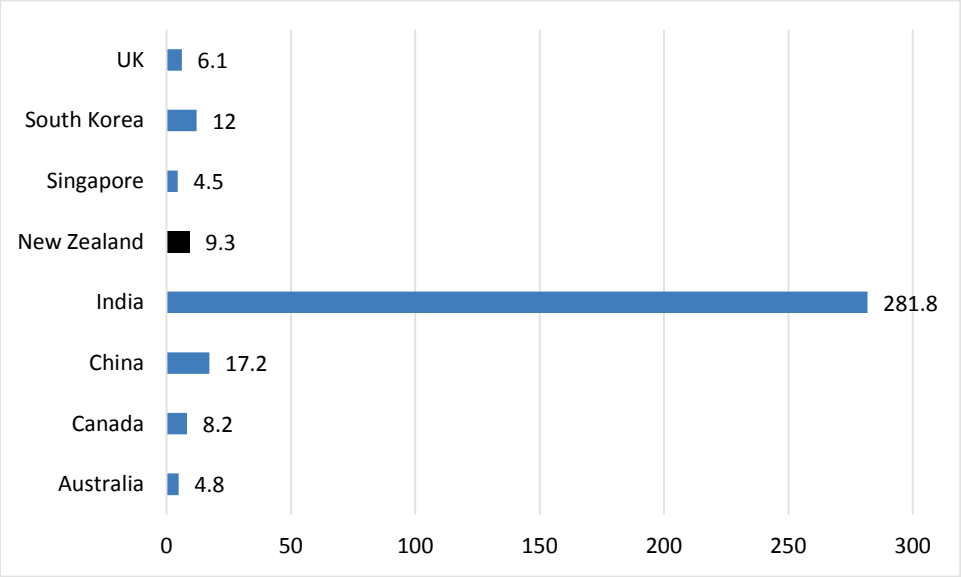
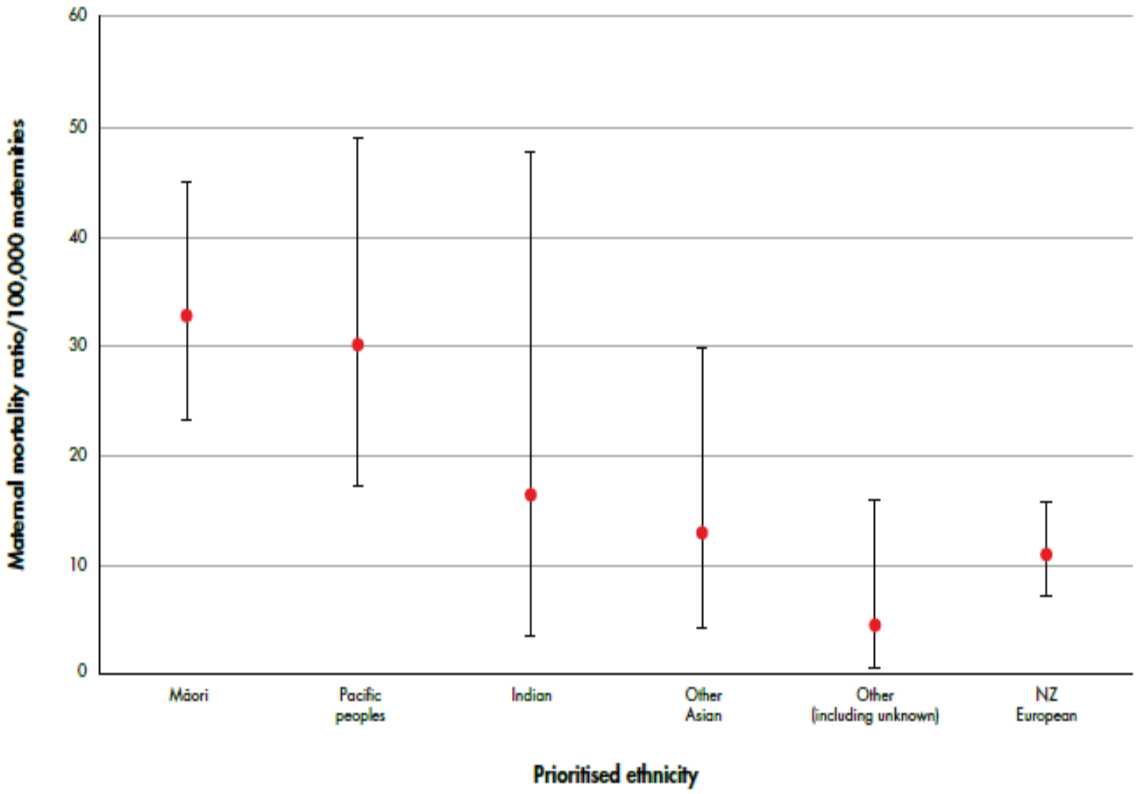


Figure 105 Maternal mortality ratio (per 100,000 livebirths) by country, GBD 2013

According to the PMMRC report, 'there has been no statistically significant change in maternal mortality ratio in New Zealand since data collection by the PMMRC began in 2006'. The three-year average MMR for 2011–2013, was 16.8/100,000 maternities (95 CI: 11.8, 23.8/100,000). The MMR

for direct deaths alone for the years 2009–2013 was 4.8/100,000 maternities (95% CI: 2.9, 7.9/100,000), and for indirect deaths 11.8/100,000 maternities (95%CI: 8.6, 16.2/100,000) (PMMRC, 2015).

New Zealand Indian and Other Asians had slightly greater MMR compared to New Zealand European, but the differences were not significant (***Figure 105***). We assume the Asians in Waitemata and Auckland DHBs followed the national pattern as illustrated below and had comparable rates to other high income countries.



Source: PMMRC. 2015. Ninth Annual Report of the Perinatal and Maternal Mortality Review Committee: Reporting mortality 2013. Wellington: Health Quality & Safety Commission.

Figure 106 Maternal mortality ratio (per 100,000 maternities) by ethnicity, New Zealand

Low birth weight

According to the World Bank, India had a much higher rate of low birth weight than all other countries on the list. China had the lowest rate of low birth weight and New Zealand was comparable to all other countries except India, China and Singapore.

Table 95 Low birth weight rate (%) by country, World Bank

Country	Low birthweight rate (%)	Most recent year of data available
Australia	6.2	2010
Canada	6.1	2011
China	2.38	2012
India	28.0	2006
Korea, Rep.	4.4	2006
New Zealand	5.7	2012
Singapore	9.5	2011
UK	7.0	2011

Data source: http://data.worldbank.org/indicator/SH.STA.BRTW.ZS, accessed 6 February 2016

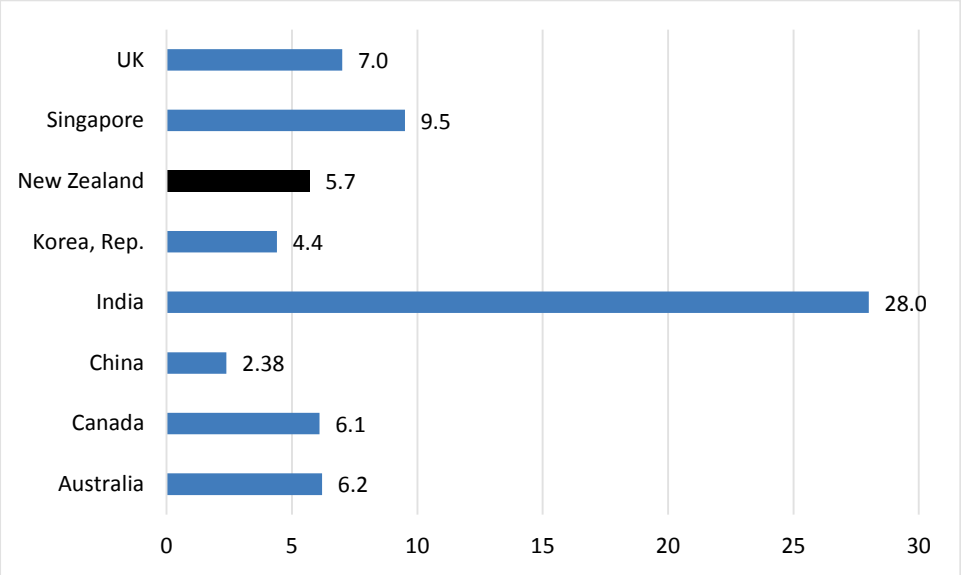


Figure 107 Low birthweight rate (%) by country, World Bank

The low birth weight rate was 6.2% in 2012 according to the Ministry of Health (Ministry of Health, 2015), and it has been stable at around 6.0% since 2008. These rates were very close to the World Bank figures (The World Bank, 2016). Nationwide, Asian had higher rates of low birth weight than European/Other or the total population. The low birth weight rates were respectively 6.5% and 8.3% for Waitemata and Auckland DHBs over the years 2010-2012 combined, which places Waitemata Asian close to the UK (the third highest at country level) and Auckland Asian close to Singapore (the second highest). In both DHBs, Indian had the highest rates of all three Asian sub-groups (8.3% in Waitemata DHB and 12.2% in Auckland DHB), whereas Chinese did the best at 5.2%-5.8% and Other Asian sat at slightly more than 7% in both DHBs (**Table 97**).

Table 96 Low birth weight rate (%) by ethnicity, maternal age group, deprivation and DHB, New Zealand

Category	Babies born with low birthweight[1]					Percentage of babies born with low birthweight[1]				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Overall										
Total	3728	3694	3709	3593	3711	6.0	6.0	6.0	6.1	6.2
Maternal age group (years)										
<20	342	324	316	252	239	6.9	7.0	7.2	6.5	6.4
20–24	614	709	705	684	623	5.6	6.2	6.1	6.1	5.8
25–29	810	807	809	828	844	5.5	5.4	5.3	5.6	5.6
30–34	910	921	934	905	967	5.5	5.5	5.5	5.5	5.8
35–39	713	705	677	676	619	6.5	6.4	6.3	6.6	6.3
40+	167	183	214	203	227	7.3	7.7	8.4	8.4	8.9
Unknown	172	45	54	45	192	-	-	-	-	-
Ethnic group										
Māori	1130	1093	1169	1093	1119	6.9	6.8	7.2	7.0	7.1
Pacific peoples	353	357	348	397	325	5.0	5.0	4.8	5.7	4.8
Asian	409	461	464	499	637	6.8	7.2	6.7	6.9	7.5
European or Other	1825	1774	1721	1599	1624	5.7	5.6	5.5	5.4	5.6
Unknown	11	9	7	5	6	-	-	-	-	-
Deprivation quintile										
1 (least deprived)	430	494	451	436	473	5.0	5.6	5.1	5.1	5.4
2	557	547	540	529	519	5.8	5.6	5.5	5.5	5.3
3	716	678	668	662	663	6.2	5.8	5.8	5.9	5.9
4	810	817	889	840	856	5.9	5.9	6.4	6.2	6.3
5 (most deprived)	1207	1153	1152	1117	1191	6.7	6.6	6.6	6.8	7.2
Unknown	8	5	9	9	9	-	-	-	-	-
DHB of residence										
Northland	121	119	148	128	140	5.9	5.6	6.5	6.0	6.6
Waitemata	420	422	451	386	439	5.5	5.5	5.8	5.0	5.6
Auckland	390	395	382	399	409	6.0	5.9	5.7	6.2	6.2
Counties Manukau	528	487	507	532	549	6.1	5.7	5.9	6.2	6.3

Data source: Ministry of Health. 2015. Report on Maternity, 2012. Wellington: Ministry of Health.

Table 97 Low birth weight rate (%) by ethnicity, Waitemata and Auckland DHBs, 2010-12

DHB	Prioritized ethnicity	<2500g	2500g+	Low birth weight rate
Waitemata	European/Other	611	10,869	5.3%
	Māori	280	4,505	5.9%
	Pacific	105	2,765	3.7%
	Other Asian	109	1,422	7.1%
	Chinese	115	2,116	5.2%
	Indian	87	955	8.3%
Auckland	European/Other	367	7,500	4.7%
	Māori	172	2,584	6.2%
	Pacific	182	3,693	4.7%
	Other Asian	109	1,381	7.3%
	Chinese	123	1,985	5.8%
	Indian	205	1,479	12.2%

Infant and child mortality rates

According to the UN IGME report (UN IGME, 2015), Southern Asia is another region besides Sub-Saharan Africa where acceleration is urgently required to reduce child mortality.

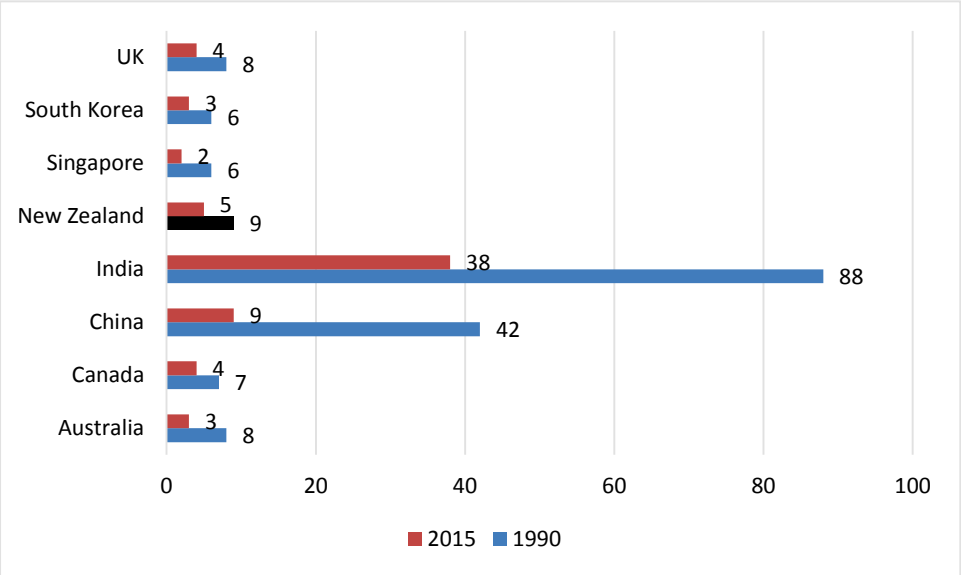
International efforts have been made to agree on a new framework, the Sustainable Development Goals (SDGs), with the end of the MDG. The SDG target with an under-five mortality rate of 25 or fewer deaths per 1,000 had been achieved by all the countries except India. The under-five mortality rate target of the high-income countries of 6.8 deaths per 1,000 live births by 2030 had also been achieved by all the high income countries on the list. China is not far away from the 2030 SDG target, although it is a middle income country, and in fact, between 1990 and 2015, China had made the fastest reduction in under five mortality rate (annualised rate of reduction, ARR: 6.5%), followed by Singapore (ARR, 4.2%) and India (ARR 3.9%). In 2015, New Zealand had an under-five mortality rate of 6 per 1000 live births, which was the poorest result of all the high income countries on the list, although the differences were not always significant.

Table 98 Under-five mortality rate (U5MR, per 1000 live births) by country, the United Nations

Country	**2000** (90% UI)	**2015** (90% UI)	Annual rate of reduction (ARR, %) 1990-2015
Australia	6 (6, 6)	4 (4, 4)	3.5
Canada	6 (6, 6)	5 (4, 6)	2.1
China	37 (35, 39)	11 (9, 13)	6.5
India	91 (88, 95)	48 (42, 53)	3.9
New Zealand	7 (7, 8)	6 (5, 7)	2.7
Singapore	4 (4, 4)	3 (2, 3)	4.2
South Korea*	6 (6, 6)	3 (3, 4)	2.9
UK	7 (6, 7)	4 (4, 5)	3.2

Data source: Levels and trend in Child Mortality - Report 2015: page 18-25

In 2015, New Zealand had an infant mortality rate of 5 per 1000 live births, which was largely comparable to all other countries on the list except India, which was more than seven times the rate of New Zealand. Singapore had the lowest infant mortality rate at 2 per 1000 live births and was the second fastest country reducing the rate between 1990 and 2015, with China being the leading country.

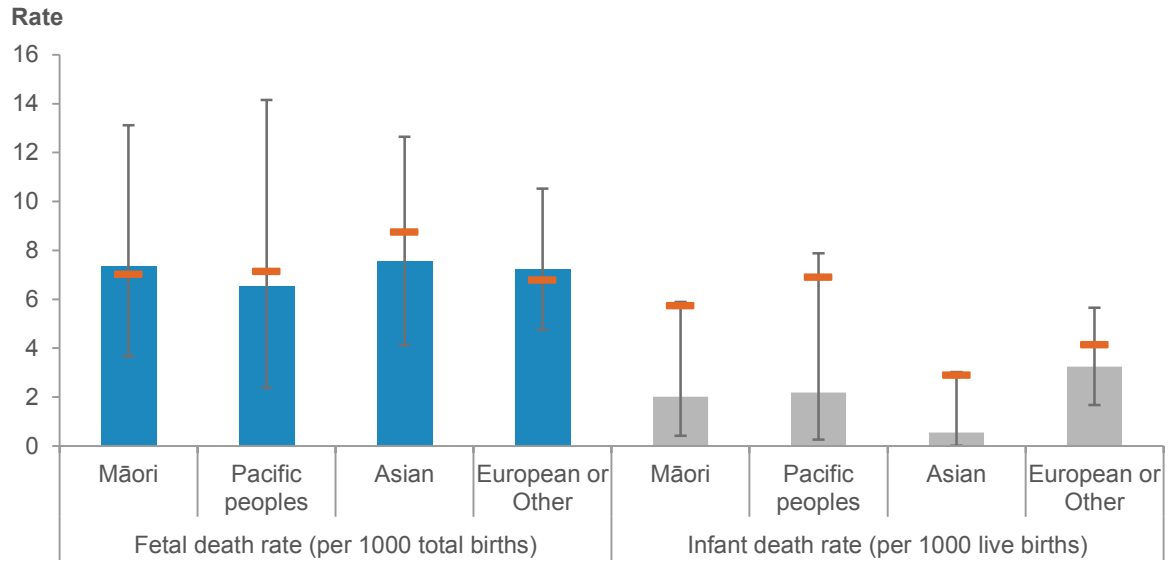


Data source: Levels and trend in Child Mortality - Report 2015: page 18-25

Figure 108 Infant mortality rate (per 1000 live births) by country, the United Nations

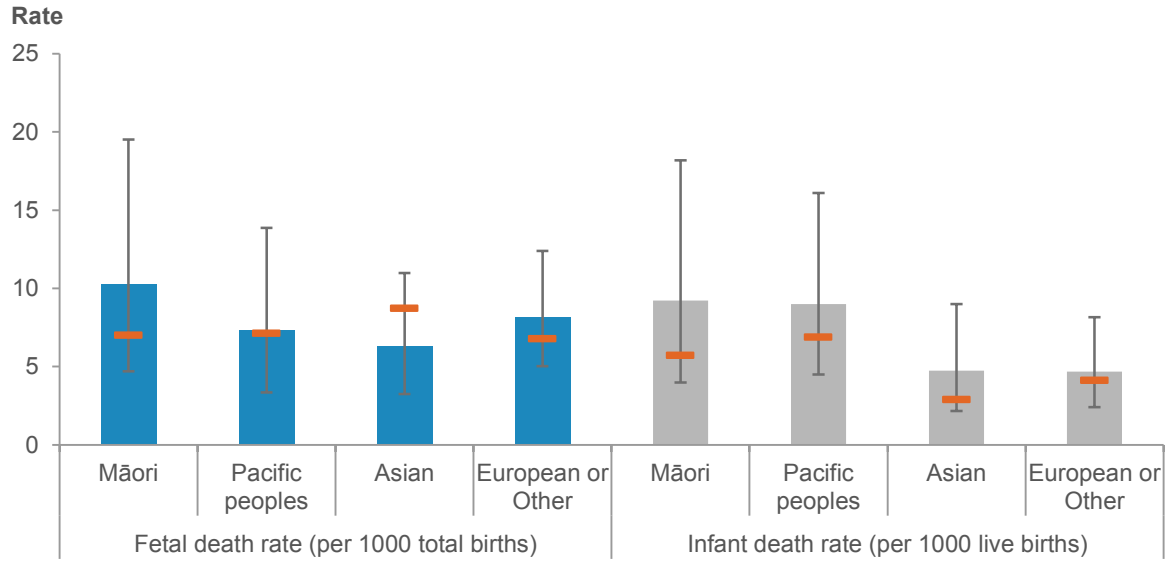
In recent years, the New Zealand Ministry of Health has published foetal and infant death data and statistics annually using quality vital registration data. The figures below indicated that Asians in both DHBs did better than or equally well as compared to European/Other, with infant mortality rates being 0.5 and 4.7 per 1000 live births respectively for Waitemata and Auckland DHB Asian infants (Ministry of Health, 2015).

However, for relatively small populations, random variation in the number of deaths tends to have larger effects than for bigger populations. For this reason, deaths over three years (2010-12) were aggregated to calculate the two rates. The aggregated infant mortality rates were respectively 0.2 and 4.0 per 1000 live births for Waitemata and Auckland DHBs' Asian infants. This has put Waitemata Asian infant rate the best place at the country level. For under five mortality rates, Waitemata stood at 0.2 per 1000 live births again and it was 4.2 per 1000 live births for Auckland DHB. Again, Waitemata Asian infants had the best results at the country level and Auckland Asians were comparable with all other high income countries (**Table 99**). No estimates were made for Asian sub-groups due to the very small number of deaths, particularly for Waitemata DHB.



Note: Blue and grey bars represent DHB foetal and infant death rates, respectively, with error bars as the 95% confidence interval. Orange dashes represent the national rate. Deprivation quintile was derived from the 2006 New Zealand Deprivation Index. (Ministry of Health, 2015)
Data source: http://www.health.govt.nz/publication/fetal-and-infant-deaths-2012, accessed 23 March 2016

Figure 109 Infant mortality rate (per 1000 live births), Waitemata DHB, 2012



Note: Blue and grey bars represent DHB foetal and infant death rates, respectively, with error bars as the 95% confidence interval. Orange dashes represent the national rate. Deprivation quintile was derived from the 2006 New Zealand Deprivation Index.
Data source: http://www.health.govt.nz/publication/fetal-and-infant-deaths-2012, accessed 23 March 2016

Figure 110 Infant mortality rate (per 1000 live births), Auckland DHB, 2012

Table 99 Infant mortality rate and under-five mortality rate, Waitemata and Auckland DHBs, 2010-12

Death rate	DHB	Ethnicity	Deaths	Live births*	Rate (per 1000)
Infant mortality rate	**Auckland**	Asian	21	5282	4.0
		European/Other	26	7867	3.3
		Māori	13	2756	4.7
		Pacific	29	3875	7.5
	Waitemata	Asian	1	4804	0.2
		European/Other	37	11480	3.2
		Māori	22	4785	4.6
		Pacific	12	2870	4.2
U5MR	**Auckland**	Asian	22	5282	4.2
		European/Other	29	7867	3.7
		Māori	18	2756	6.5
		Pacific	35	3875	9.0
	Waitemata	Asian	1	4804	0.2
		European/Other	49	11480	4.3
		Māori	28	4785	5.9
		Pacific	15	2870	5.2

Risk factors

Total burden of disease by the all risk factors combined

Australia and Canada were leaders in the age standardised mortality rate and DALYs attributable to the joint effects of all the risk factors listed above, followed by New Zealand, while India and China had the highest burden of deaths and DALYs (Figure 111, Figure 112). Singapore did slightly better in standardised rate of years of life lost. For years lived with disability, China and the Republic of Korea had the lowest burden, while India and the UK had the highest health loss due to disability attributable to the risk factors.

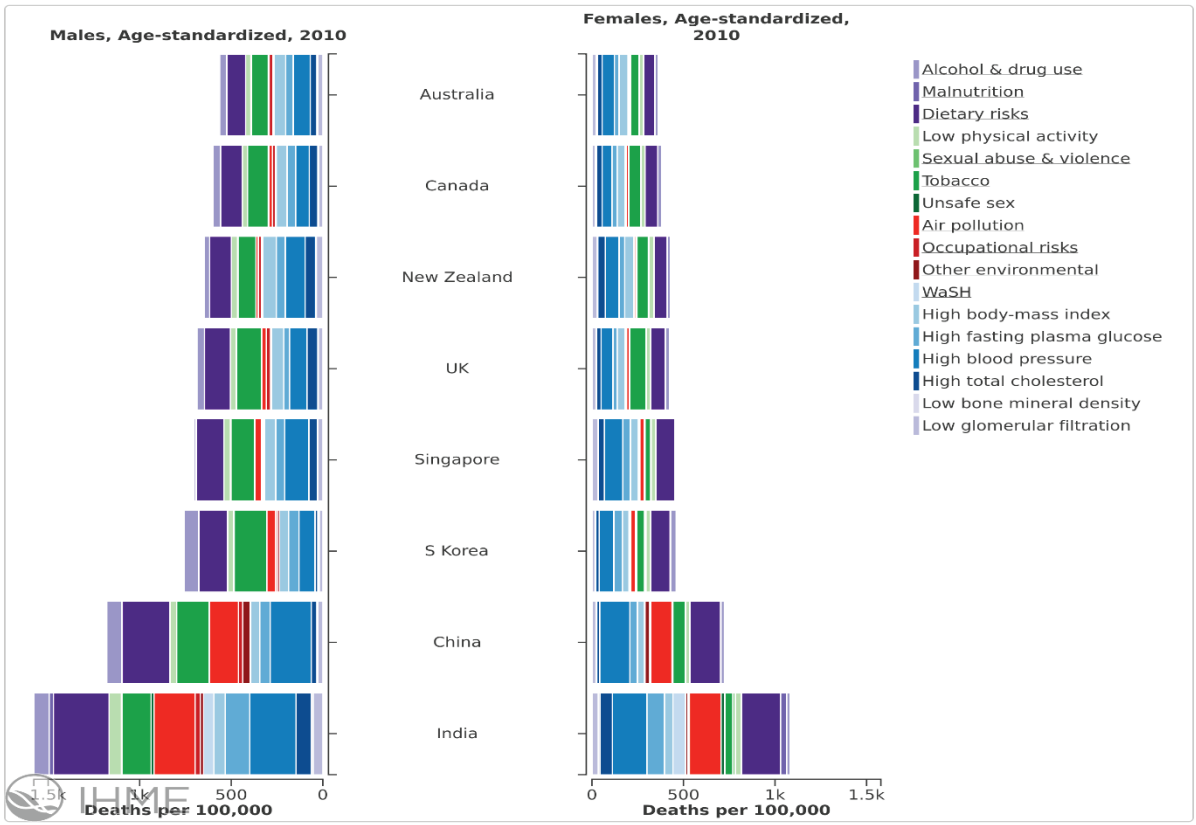


Figure 111 Age standardised mortality rate of all risk factors, by country and sex, GBD 2010

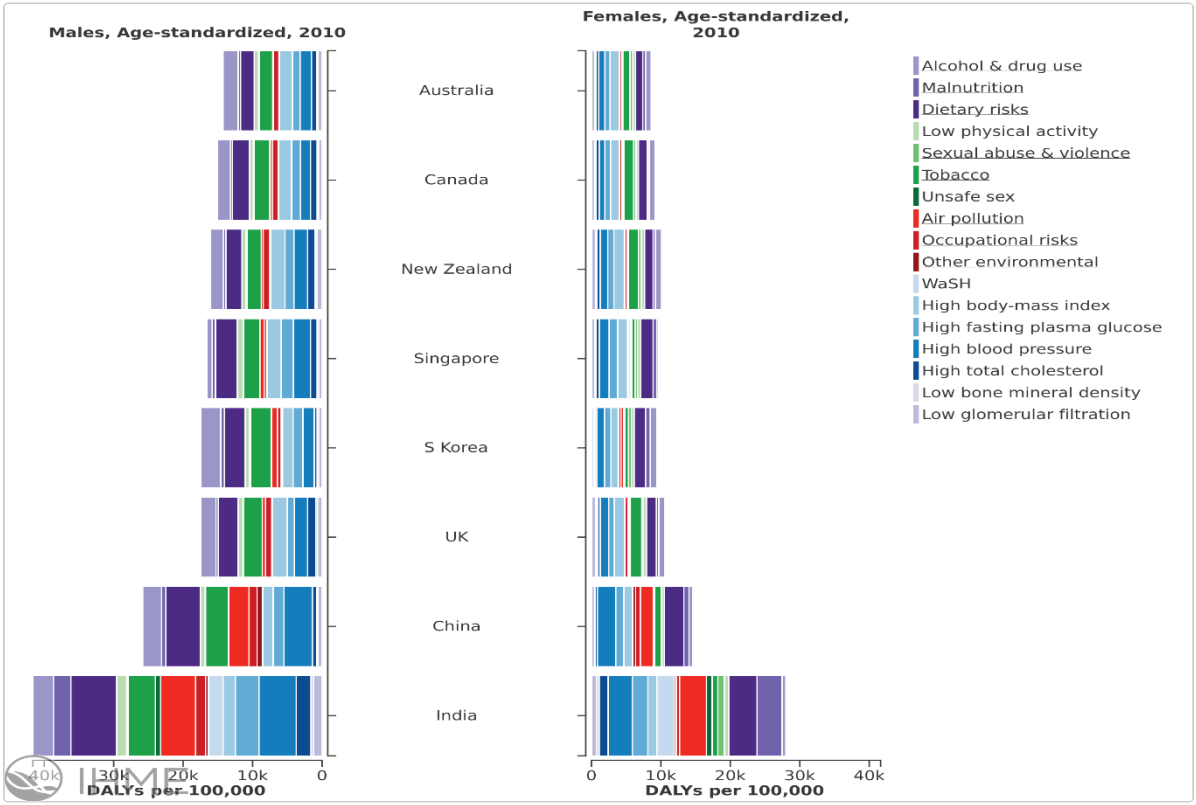


Figure 112 Age standardised DALYs of all risk factors, by country and sex, GBD 2010

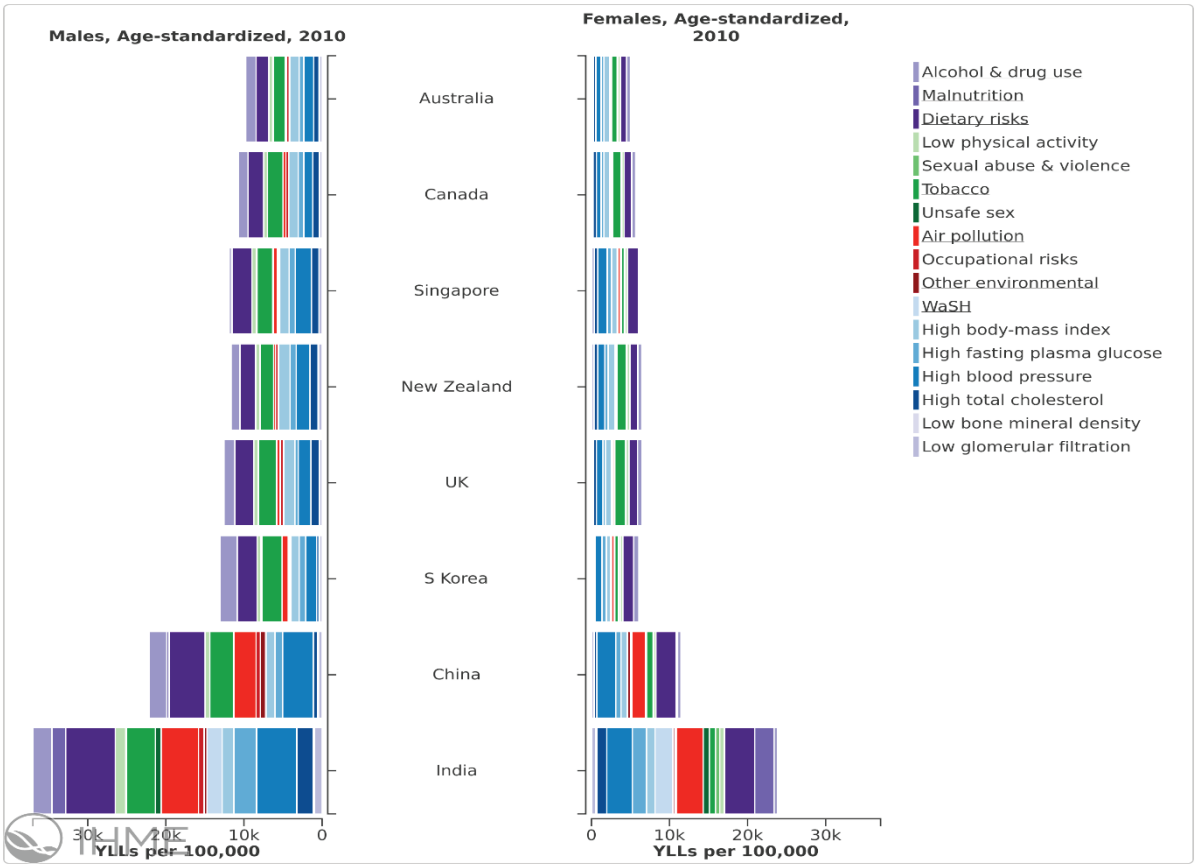


Figure 113 Age standardised YLLs of all risk factors, by country and sex, GBD 2010

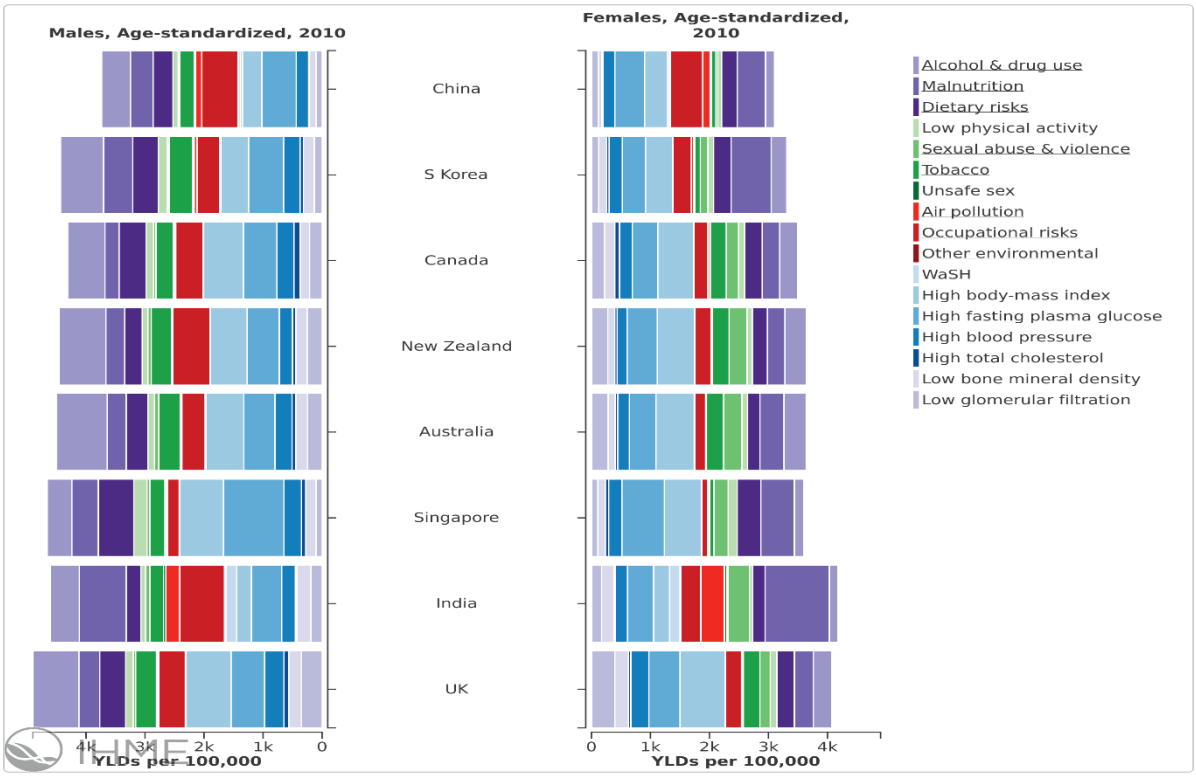


Figure 114 Age standardised YLDs of all risk factors, by country and sex, GBD 2010

Tobacco smoking

Burden of tobacco smoking at country level, GBD 2010

China and the UK had the highest mortality rate attributable to tobacco smoking, while Australia and Singapore did the best and New Zealand ranked third. India surpassed the UK and China for DALYs, whereas New Zealand was middle on the list. The distribution of years of life lost attributable to tobacco smoking was very similar to the pattern by DALYs. Again, the distribution of years lived with disability showed a very different picture to the other three metrics, all the Asian countries had a relatively lower burden than the 'Western' countries including New Zealand. This may actually suggest better survival and treatment or better health services and community support, with further investigation warranted. There were differences in the burden of disease due to tobacco smoking by sex (Table 100).

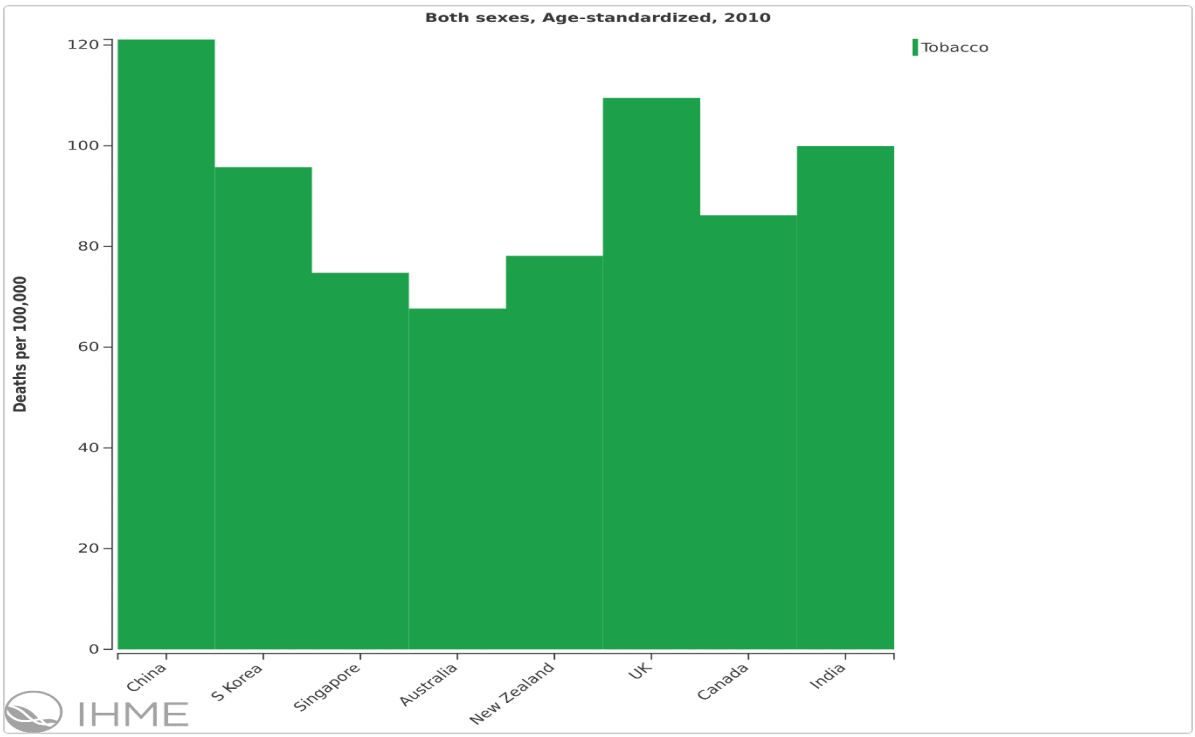


Figure 115 Age standardised mortality rate attributable to tobacco smoking, by country, both sexes, GBD 2010

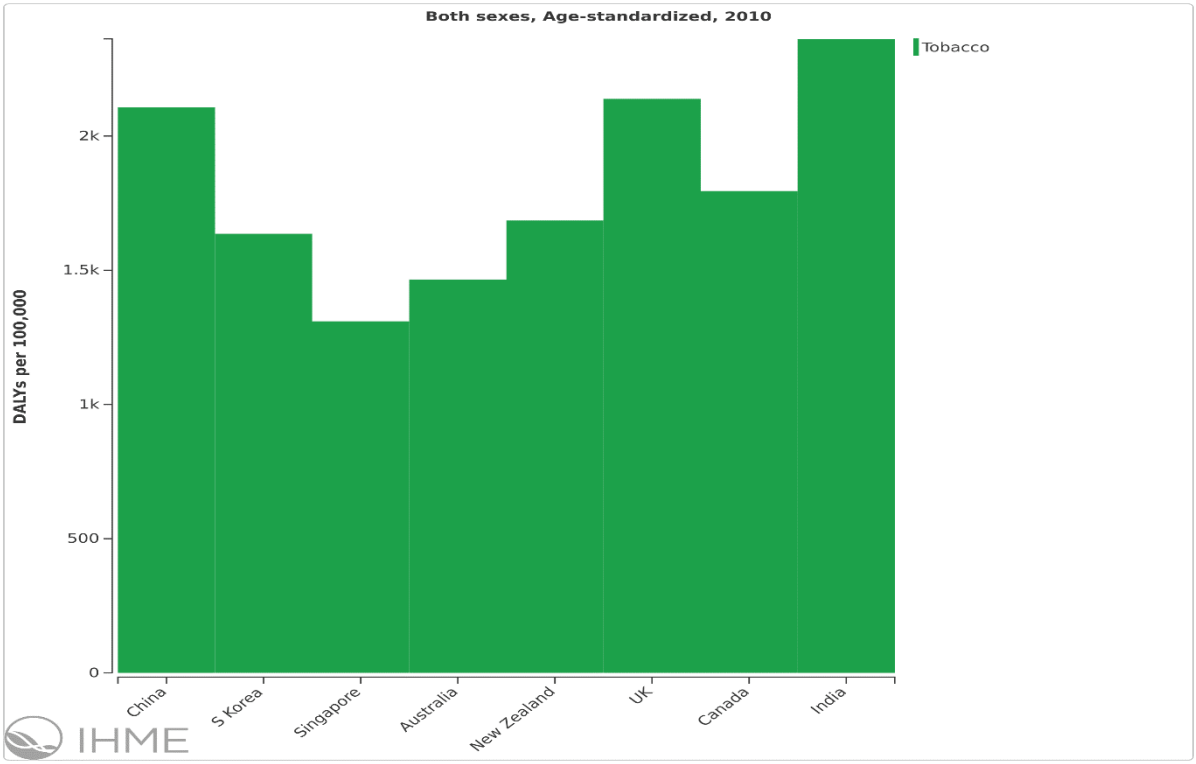


Figure 116 Age standardised DALYs attributable to tobacco smoking, by country, both sexes, GBD 2010

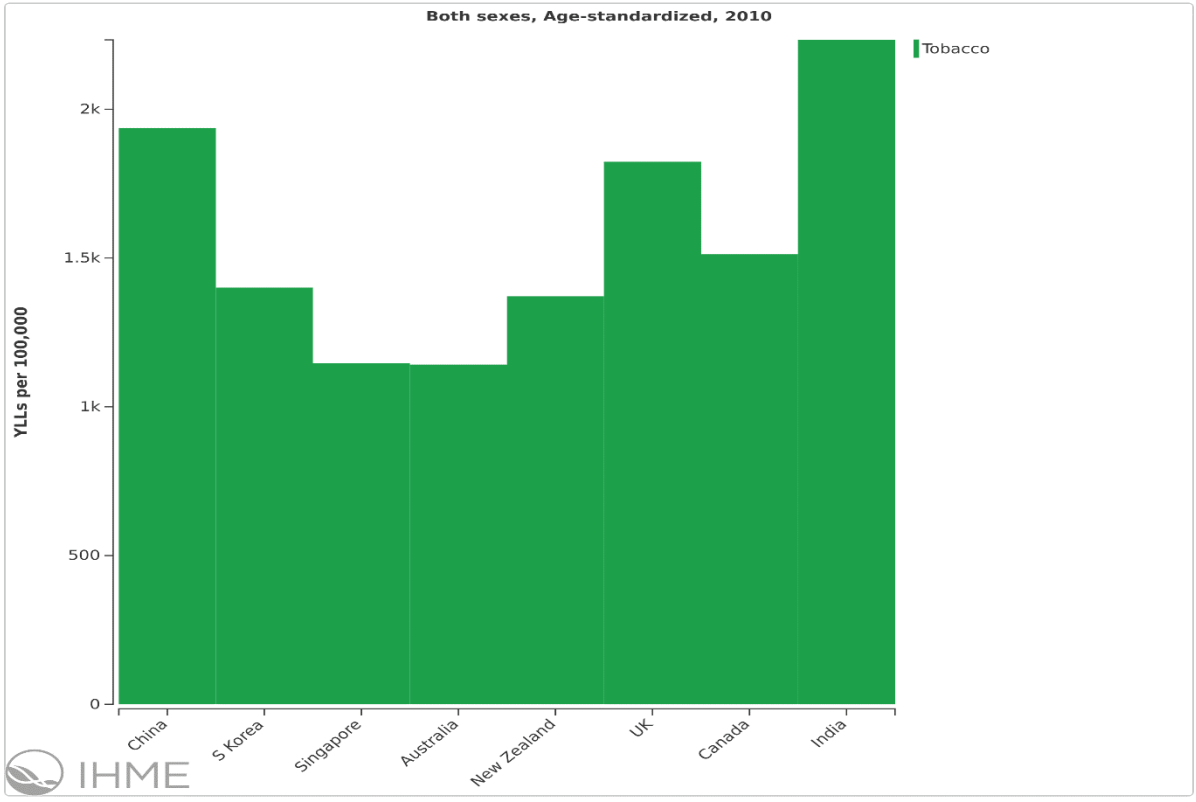


Figure 117 Age standardised YLLs attributable to tobacco smoking, by country, both sexes, GBD 2010

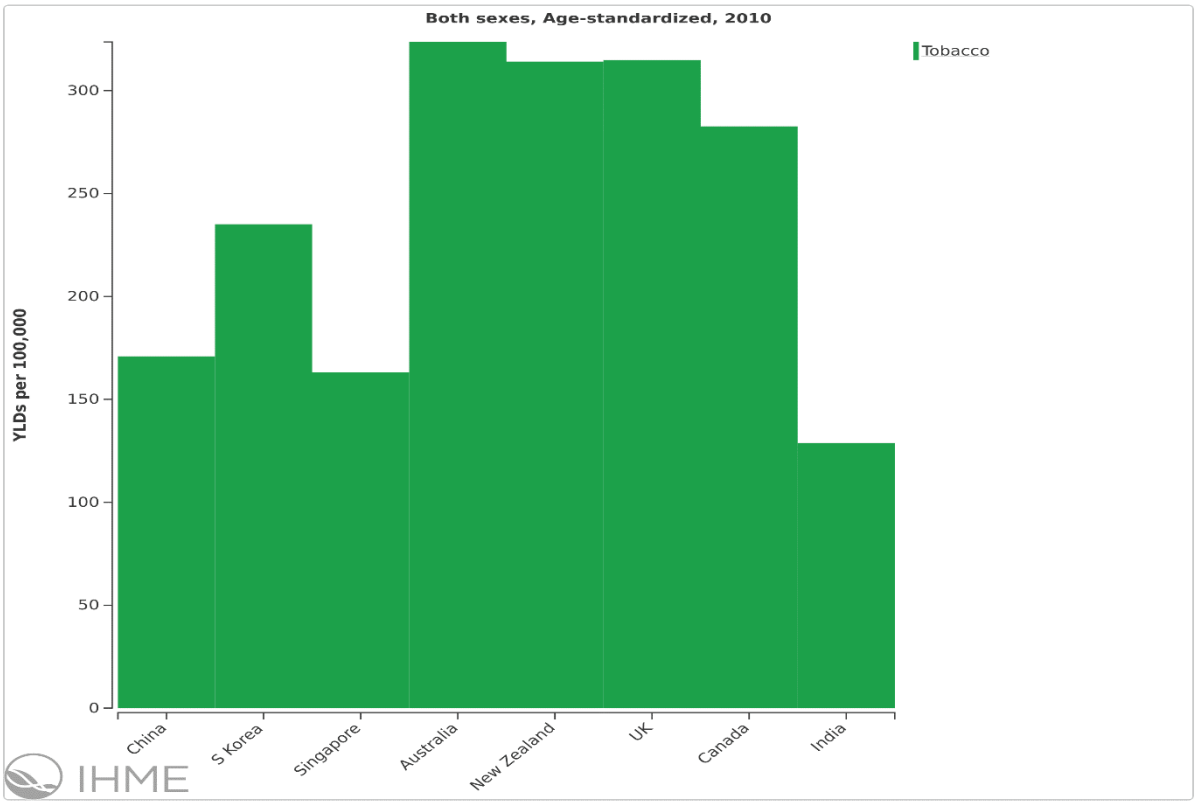


Figure 118 Age standardised YLDs attributable to tobacco smoking, by country, both sexes, GBD 2010

Table 100 All causes burden of disease attributable to tobacco smoking, by country and sex, GBD 2010

	Country	Mortality			DALYs			YLLs			YLDs		
		Rate	95% UI		Rate	95% UI		Rate	95% UI		Rate	95% UI	
Female	Australia	46.2	33.8	51.8	1050.6	835.9	1207.0	763.8	594.5	834.7	286.7	183.6	411.4
	Canada	64.8	47.3	72.8	1408.1	1134.8	1585.4	1135.0	916.9	1235.7	273.1	176.2	391.1
	China	69.4	42.5	95.7	930.7	603.2	1361.9	846.1	561.4	1206.8	84.6	35.1	166.9
	India	43.5	32.7	56.2	816.1	635.0	1023.2	785.3	609.8	979.9	30.7	16.3	67.9
	New Zealand	62.2	50.5	69.3	1386.0	1200.0	1547.8	1102.8	944.0	1198.6	283.2	188.8	405.3
	Singapore	31.8	24.4	46.3	457.4	358.2	656.4	382.7	299.1	568.4	74.7	46.6	113.3
	South Korea	44.4	34.7	53.2	569.0	463.7	679.8	470.8	387.9	558.2	98.3	63.9	140.4
	United Kingdom	86.1	72.1	95.3	1632.5	1441.7	1788.2	1353.8	1191.7	1447.2	278.7	188.5	390.2
Male	Australia	93.6	86.9	100.7	1924.7	1740.3	2106.9	1560.9	1456.6	1667.4	363.8	240.5	510.0
	Canada	113.3	105.3	122.5	2241.2	2070.2	2417.4	1947.2	1824.5	2082.4	293.9	204.8	401.3
	China	177.4	132.9	226.8	3295.7	2538.5	4246.3	3041.6	2350.2	3875.1	254.2	153.6	381.3
	India	160.0	127.2	201.7	3932.6	3087.9	5045.6	3705.8	2908.3	4749.2	226.8	136.7	353.1
	New Zealand	98.1	89.7	106.3	2029.3	1839.7	2224.2	1680.8	1542.4	1816.8	348.5	229.5	484.9
	Singapore	130.8	115.4	148.8	2293.2	2049.5	2540.9	2034.2	1837.5	2238.9	259.0	168.7	375.5
	South Korea	177.5	163.3	194.5	3035.0	2754.0	3347.8	2639.0	2425.4	2882.7	396.0	267.9	546.1
	United Kingdom	138.4	129.6	150.2	2707.6	2506.2	2899.0	2353.7	2208.4	2511.1	353.8	247.0	482.2

Prevalence of tobacco smoking

Figure 119 shows the age standardised rate of current tobacco smoking for New Zealand was 17.6% (95% credible interval: 15%-21%) in 2013, sitting in the middle of the countries being compared. China and South Korea had higher rates of smoking than New Zealand, whereas India had the lowest smoking rate for women and men combined. There were large differences in smoking rates by sex. The UK, however, had the highest current tobacco smoking rate for women (19.5%), followed by New Zealand (16.7%), with the women in the four Asian countries having very low rates. For men, Asian countries led by South Korea (51.1%) and China (48.7%) had higher rates than the four non-Asian countries (Table 101).

According to the WHO report (WHO, 2015), New Zealand's age standardised rate of daily smoking was 15.5% (95% credible interval: 13% - 18%) in 2013. Again, New Zealand sat in the middle for both sexes. However, New Zealand was the second highest following the UK for women; for men, the Republic of Korea and China had very high rates just as they did for the current tobacco smoking and New Zealand had rates comparable to all other countries except Korea and China (**Table 102**).

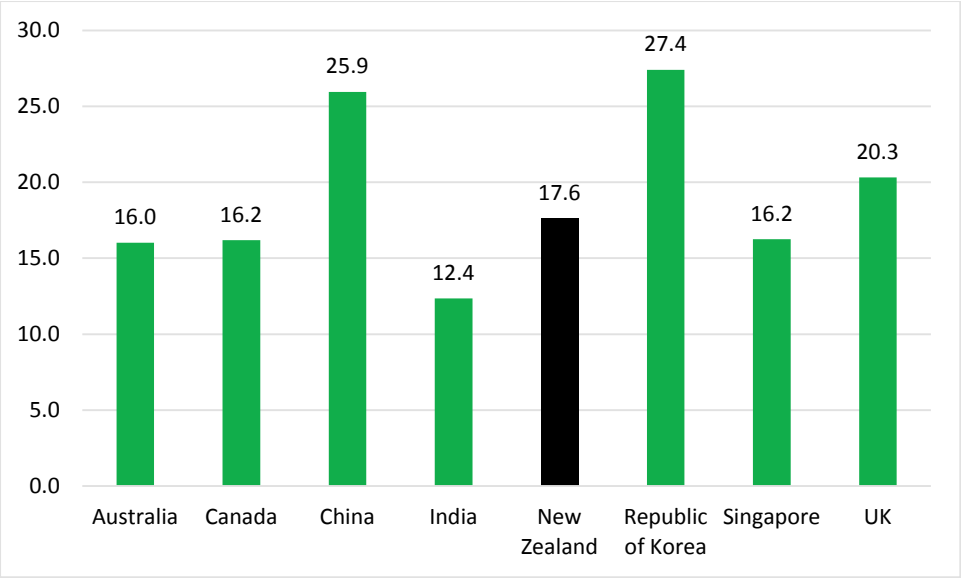


Figure 119 Age standardised prevalence rate of current tobacco smoking, by country, both sexes, 15+ years, 2013

Table 101 Age standardised prevalence rate of current tobacco smoking, by country and sex, 15+ years, 2013

Country	Female			Male		
	Rate	95% credible interval		Rate	95% credible interval	
Australia	14.3	11.9	17.3	17.8	14.7	21.7
Canada	13.6	11.2	15.8	18.9	15.7	22.4
China	1.9	1.5	2.3	48.7	38.0	58.4
India	2.3	1.7	2.8	21.9	16.5	27.8
New Zealand	16.7	14.1	19.9	18.5	15.5	21.9
Republic of Korea	4.3	2.4	6.6	51.1	34.3	69.5
Singapore	5.2	3.9	6.8	27.8	20.6	35.2
UK	19.5	15.4	25.1	21.1	16.5	27.0

Table 102 Age standardised prevalence rate of daily smoking, by country and sex, 15+ years, 2013

Country	Female			Male		
	Rate	95% credible interval		Rate	95% credible interval	
Australia	12.4	9.9	14.7	15.1	12.3	18.0
Canada	9.9	8.2	11.6	13.9	11.5	16.4
China	1.6	1.3	2.1	42.0	33.6	51.6
India	1.9	1.5	2.4	19.1	14.7	25.3
New Zealand	14.7	11.8	17.5	16.4	13.4	19.2
Republic of Korea	3.5	2.0	5.5	48.5	32.8	66.1
Singapore	3.6	2.6	4.8	23.1	17.1	28.5
UK	19.5	14.9	25.1	21.1	15.9	27.0

The New Zealand average of regular smokers was 15.1% for women and men combined (crude rate) according to Census 2013, which was slightly lower than the current tobacco smoking rate of the WHO report. However, the age standardised rates of regular smoking from Census 2013 were comparable to the daily smoking rates of the WHO report, which facilitates direct comparisons between the two DHBs and the countries of interest. For both Waitemata and Auckland DHBs, Asians had lower rates than the New Zealand average for women and men combined. There were variations by sex and Asian sub-group. Asian women had a very low rate of regular smoking (1.5%-4.0%), while Asian men (Chinese and Other Asian) had a rate similar to or even higher than their European/Other counterparts in both DHBs. Nevertheless, internationally, Asian residents seemed still to have or are close to having the lowest rate of tobacco smoking.

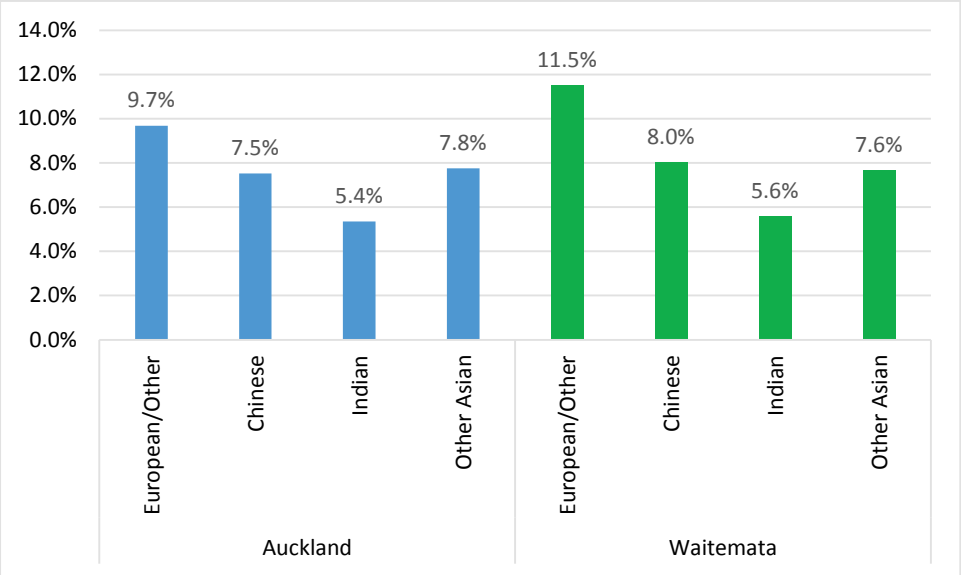


Figure 120 Age standardised prevalence rate of regular smokers, Asian sub-groups, both sexes, 2013

Table 103 Age standardised prevalence rate of regular smokers, Asian sub-groups, by sex, 2013

DHB	Ethnicity	Female			Male		
		Rate	95% confidence interval		Rate	95% confidence interval	
Auckland	Māori	26.7%	26.4%	26.9%	24.8%	24.5%	25.1%
	Pacific	17.5%	17.3%	17.7%	26.1%	25.9%	26.4%
	European /Other	8.2%	8.1%	8.2%	11.3%	11.2%	11.4%
	Chinese	2.4%	2.3%	2.4%	13.8%	13.7%	14.0%
	Indian	1.5%	1.4%	1.5%	8.9%	8.7%	9.0%
	Other Asian	4.0%	3.9%	4.1%	12.9%	12.7%	13.1%
Waitemata	Māori	28.0%	27.7%	28.2%	24.8%	24.6%	25.1%
	Pacific	16.6%	16.4%	16.9%	23.3%	23.0%	23.6%
	European /Other	10.2%	10.2%	10.3%	12.8%	12.8%	12.9%
	Chinese	2.0%	1.9%	2.0%	15.2%	15.0%	15.4%
	Indian	1.6%	1.5%	1.7%	9.5%	9.3%	9.7%
	Other Asian	2.9%	2.8%	3.0%	13.3%	13.1%	13.5%

Table 104 Age standardised prevalence rate of current smoking* by ethnicity, both sexes, NZHS 2011-13

DHB	Asian		European/Other		All	
	Rate	*(95% CI)*	Rate	*(95% CI)*	Rate	*(95% CI)*
Waitemata	9.9	(6.0-15.1)	16.6	*(13.9-19.5)*	15.8	*(13.6-18.3)*
Auckland	8.8	(6.2-12.0)	12.9	*(10.3-15.9)*	12.6	*(10.5-14.9)*
Counties-Manukau	8.7	(5.5-12.7)	15.5	*(12.3-19.1)*	18.6	*(16.0-21.4)*
All 3 Auckland DHBs	9.5	(7.7-11.5)	14.8	*(13.2-16.6)*	15.5	*(14.1-17.0)*
NZ	10.0	(8.5-11.7)	17.9	*(17.0-18.7)*	19.3	*(18.6-20.0)*

* Current smoking: has smoked more than 100 cigarettes in lifetime and currently smokes at least once a month

Table 105 Age standardised prevalence rate of daily smoking by ethnicity, both sexes, NZHS 2011-13

DHB	Asian		European/Other		All	
	Rate	(95% CI)	Rate	(95% CI)	Rate	(95% CI)
Waitemata	8.6	(4.6-14.2)	13.4	*(11.1-15.8)*	12.9	*(10.9-15.2)*
Auckland	6.9	(4.1-10.9)	8.8	*(6.8-11.1)*	9.6	*(7.5-12.1)*
Counties-Manukau	8.0	(5.0-12.0)	14	*(10.8-17.7)*	16.7	*(14.1-19.4)*
All 3 Auckland DHBs	8.2	(6.3-10.3)	11.7	*(10.3-13.2)*	12.9	*(11.6-14.3)*
NZ	8.4	(6.9-10.2)	15.6	*(14.9-16.4)*	17.1	*(16.4-17.8)*

High Body Mass Index

Worldwide, the overweight rate was 39% of adults aged 18 years and over and it was 13% for obesity. In addition, overweight and obesity kills more people than underweight for most of the world's population. There is good evidence linking obesity and overweight to many non-communicable conditions, including cardiovascular diseases (mainly heart disease and stroke), diabetes, musculoskeletal disorders and some cancers (endometrial, breast, and colon).

In response to the obesity epidemic, the WHO Global Strategy on Diet, Physical Activity and Health was adopted by the World Health Assembly in 2004. In addition, the Commission on Ending Childhood Obesity (ECHO) presented its final report 'Ending Childhood obesity' in January 2016 to the WHO Director-General to address the alarming world-wide levels of childhood obesity and overweight (WHO, 2016).

Burden of high body mass index at country level, GBD 2010

New Zealand had the highest mortality rate attributable to high Body Mass Index (BMI) (60.8 per 100,000, 95UI: 52-71) of all the countries on the list for women and men combined, followed by Australia and the UK, while the Republic of Korea and China had the lowest rate of high BMI. For DALYs, the UK surpassed New Zealand, while Korea and China were still the lowest. India became the country with the highest rate of years of life lost, followed by New Zealand, with Korea still having the lowest rate. The UK again held the highest burden of years lived with disability attributable to high BMI, followed by Singapore; New Zealand had a rate comparable to Australia and Canada. The remaining Asian countries, namely, India, Korea and China had lower rates of YLDs attributable to high BMI. Generally, men had a higher burden of health loss attributable to high BMI than women for all the four metrics.

There is some evidence suggesting an alternate set of criteria for obesity and overweight for Asians based on measured body fat. More research is required to address accurate measures of body fat for Asians as they are more likely to be 'TOFI' ('thin outside and fat inside') (Stewart, 2015). If it becomes internationally acceptable, the measurable burden of disease attributable to high body mass index will be greater than it is now for Asian countries.

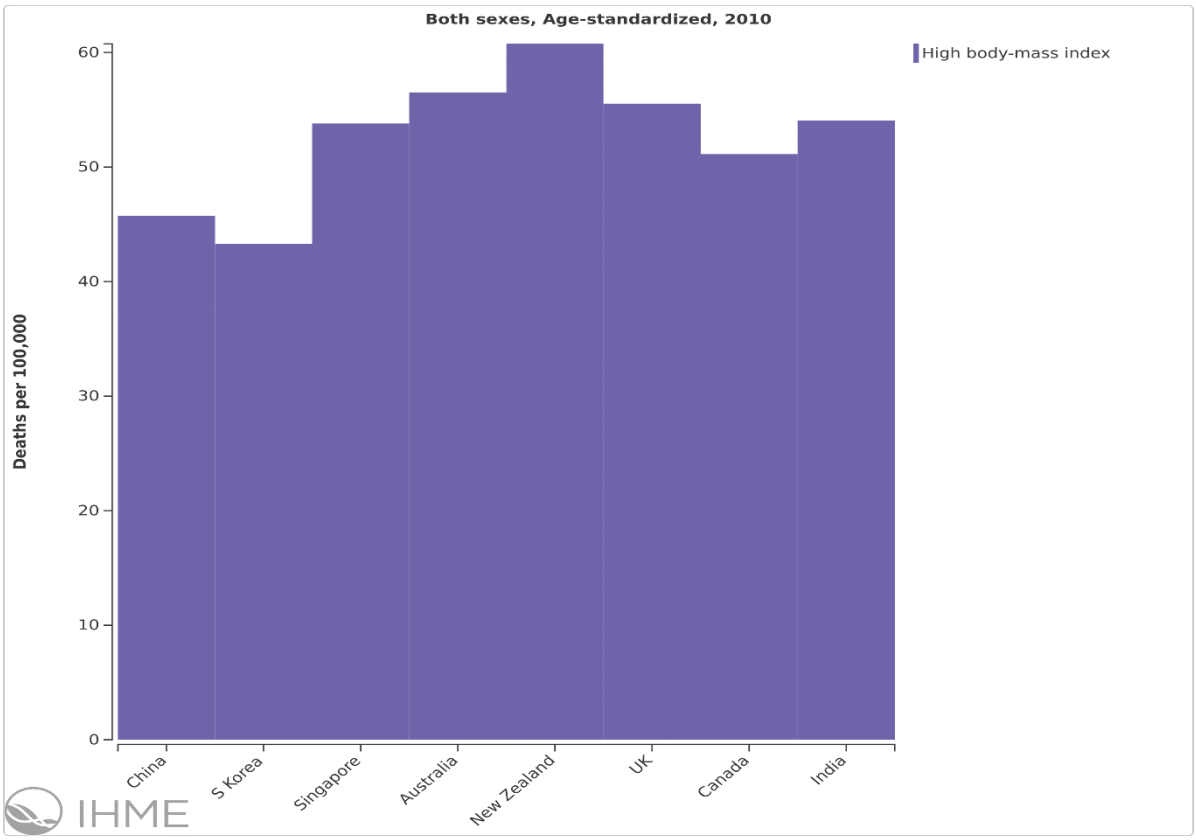


Figure 121 Age standardised mortality rate attributable to high BMI, by country, both sexes, GBD 2010

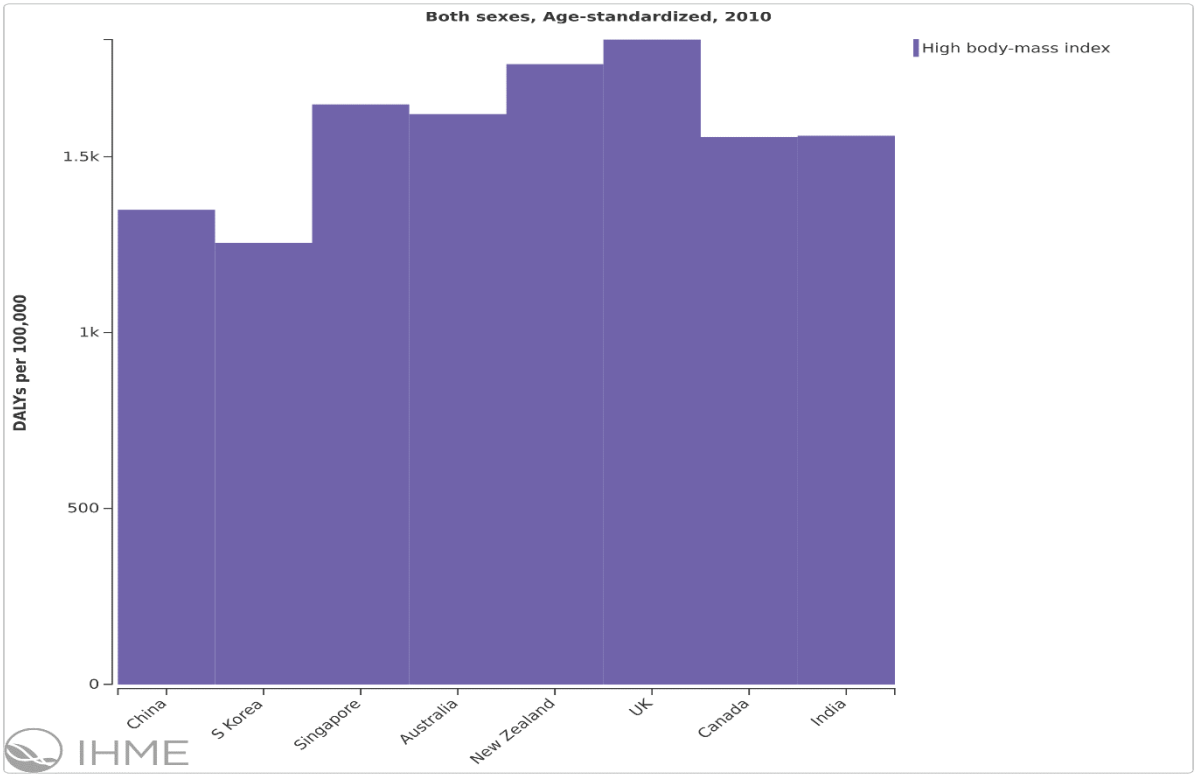


Figure 122 Age standardised DALYs attributable to high BMI, by country, both sexes, GBD 2010

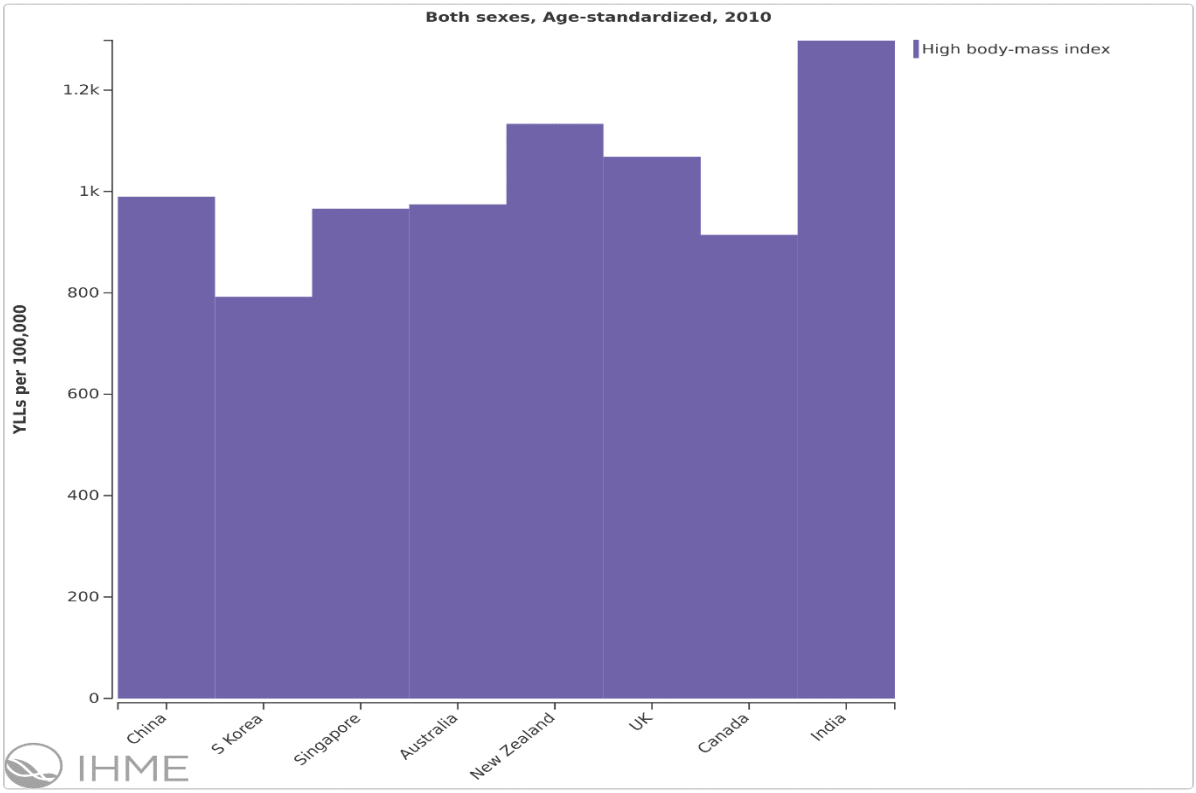


Figure 123 Age standardised YLLs attributable to high BMI, by country, both sexes, GBD 2010

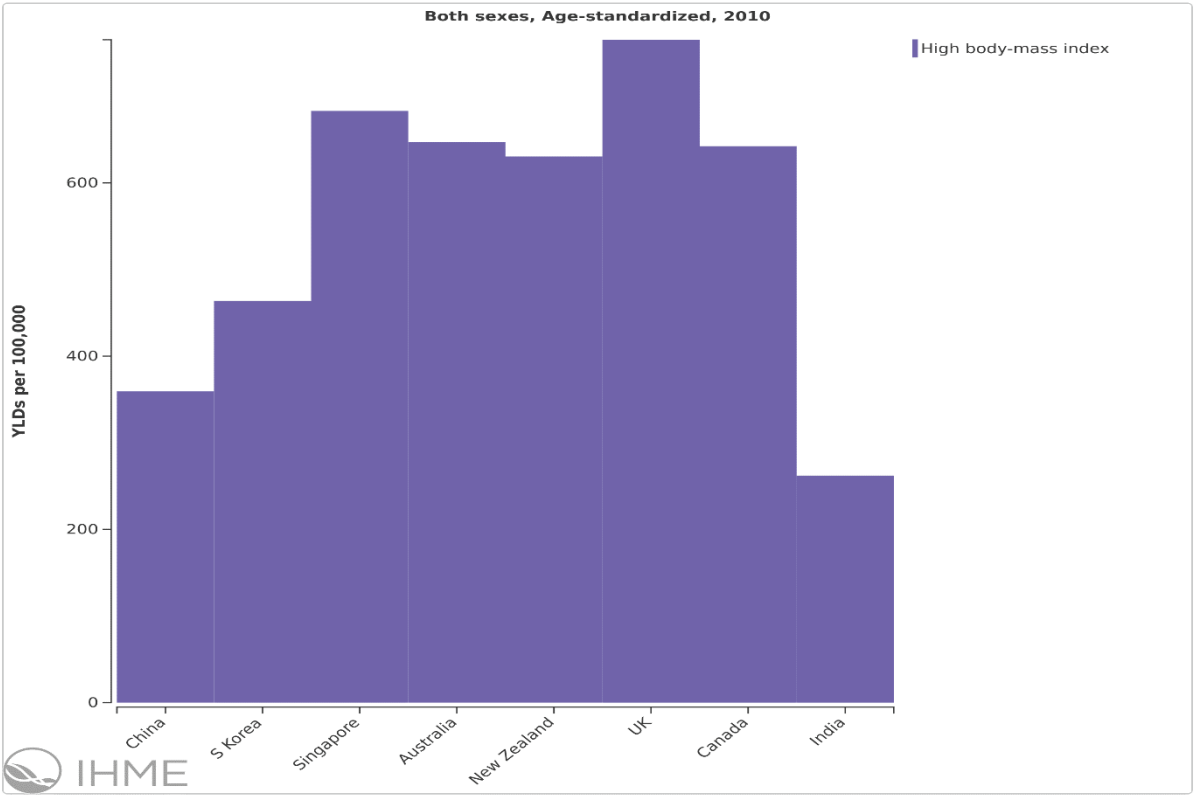


Figure 124 Age standardised YLDs attributable to high BMI, by country, both sexes, GBD 2010

Table 106 All causes burden of disease attributable to high BMI, by country and sex, GBD 2010

	Country	Mortality			DALYs			YLLs			YLDs		
		Rate	95% UI		Rate	95% UI		Rate	95% UI		Rate	95% UI	
Female	Australia	48.8	40.2	59.7	1406.2	1189.0	1660.0	755.8	661.6	893.2	650.4	451.2	874.2
	Canada	42.0	34.2	51.9	1284.0	1044.2	1550.7	675.8	577.6	807.0	608.2	425.3	839.1
	China	40.7	30.9	50.9	1201.6	928.7	1500.0	813.9	629.7	1011.2	387.8	255.8	549.0
	India	47.1	33.2	62.4	1343.4	980.1	1716.6	1069.4	749.5	1397.6	274.0	175.9	390.4
	New Zealand	49.1	40.8	58.3	1477.6	1234.3	1733.0	845.3	735.3	984.9	632.3	440.6	839.5
	Singapore	45.7	34.4	57.6	1371.2	1068.4	1679.3	744.9	592.3	895.4	626.2	417.7	874.2
	South Korea	37.3	28.0	47.1	1029.3	770.3	1314.1	574.9	440.9	721.1	454.4	297.8	644.6
	United Kingdom	44.5	37.1	53.0	1531.0	1262.3	1815.6	772.6	666.8	908.6	758.4	544.2	1002.7
Male	Australia	64.3	54.7	73.5	1845.9	1578.0	2137.1	1202.8	1053.9	1345.8	643.1	448.6	859.9
	Canada	61.0	51.4	70.3	1846.1	1556.7	2168.4	1168.6	1009.0	1321.8	677.5	480.1	903.1
	China	50.5	36.7	66.4	1488.2	1092.2	1916.5	1158.3	844.8	1512.1	329.9	213.3	473.9
	India	61.0	43.6	81.0	1768.2	1296.2	2317.9	1519.4	1082.8	2017.9	248.8	159.7	357.8
	New Zealand	73.7	62.7	84.7	2075.0	1788.9	2398.4	1446.3	1264.1	1613.5	628.6	444.3	857.9
	Singapore	62.7	50.5	75.8	1944.6	1568.0	2378.0	1203.0	990.5	1416.6	741.6	483.9	1057.1
	South Korea	48.2	35.9	61.7	1478.6	1124.6	1843.3	1015.0	772.6	1281.9	463.5	302.9	643.9
	United Kingdom	67.5	57.7	77.5	2153.9	1835.4	2482.4	1382.8	1211.6	1555.7	771.2	547.5	1012.9

Prevalence of high BMI

The Global Health Observatory data repository of the WHO provides the estimates of obesity by country and WHO region (WHO, 2016). There were increases in the age standardised prevalence rate of obesity (18+ years) between 2010 and 2014 for all the countries on the list (though the differences were not always statistically significant). The Asian countries had much lower obesity rates (defined as equal to or greater than 30 kg per m^2) than the four non-Asian countries led by New Zealand (both sexes, 29.2%, 95%CI: 25%-33%). Women had higher prevalence rates of obesity than men for all the countries on the list. By sex, New Zealand still ranked the top for women, but was overtaken by Australia for men in 2014 (**Table 107**).

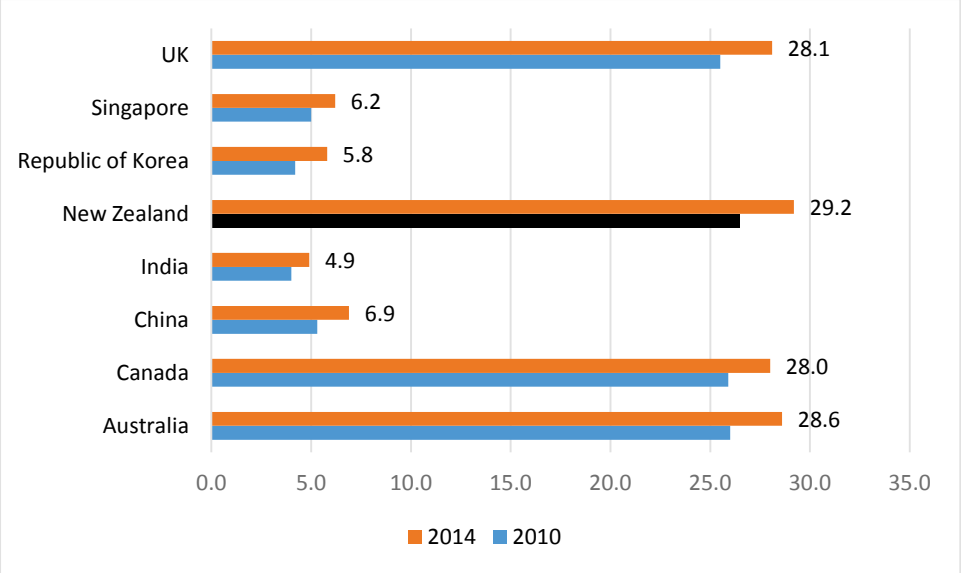


Figure 125 Age standardised prevalence of obesity, 18+ years, by country, both sexes, WHO

Table 107 Age standardised prevalence of obesity, 18+ years, by country and sex, WHO

Country	2014		2010	
	Female	Male	Female	Male
Australia	28.8 (23.3-34.5)	28.4 (22.8-34.3)	26.3 (22.4-30.3)	25.6 (21.8-29.7)
Canada	29.1 (23.1-35.4)	26.8 (20.8-33.4)	27.2 (22.8-31.7)	24.6 (20.3-29.1)
China	8.0 (4.7-12.3)	5.9 (3.2-9.3)	6.4 (4.2-8.9)	4.3 (2.7-6.3)
India	6.7 (4.4-9.6)	3.2 (1.8-5.1)	5.6 (4.1-7.4)	2.5 (1.6-3.7)
New Zealand	30.8 (25.2-36.6)	27.7 (22.1-33.7)	28.1 (24-32.6)	24.8 (20.8-29.2)
Republic of Korea	6.7 (3.9-10.5)	4.8 (2.6-7.7)	4.9 (3.3-7)	3.5 (2.2-5.1)
Singapore	6.8 (4.3-10.1)	5.7 (3.4-8.7)	5.6 (3.8-7.9)	4.4 (2.9-6.4)
UK	29.2 (24.4-34.2)	26.9 (22.1-32.2)	26.8 (23.6-30.2)	24.1 (21-27.5)

The NZHS 2011/12 and 2012/13 aggregated data (Ministry of Health, 2016) indicated that Asian people in both DHBs had lower rates than the New Zealand average (**Table 108**), which was comparable to the WHO estimate in 2014. In the international context, the Asian rates of obesity in both DHBs were higher than that of the Asian countries although there seemed to be some overlaps in the confidence intervals. Using ethnic specific definitions of obesity, it was found that the

prevalence of obesity was higher in all three Asian sub-groups (aside from Chinese women) than European/Other, using NZHS 2011-13 data (Scragg, 2016).

Table 108 Age standardised prevalence of obesity, 18+ years, both sexes, NZHS 2011-13

DHB	Asian		European/Other		All	
	Rate	*(95% CI)*	Rate	*(95% CI)*	Rate	*(95% CI)*
Waitemata	14.1	(9.4-19.9)	22.0	(19.1-25.2)	23.4	(20.5-26.6)
Auckland	11.6	(7.8-16.3)	18.5	(15.4-22.0)	21.5	(18.9-24.2)
Counties-Manukau	20.7	(16.3-25.7)	31.8	(28.3-35.6)	40.5	(36.7-44.4)
All 3 Auckland DHBs	15.3	(12.7-18.2)	23.0	(20.9-25.2)	27.8	(25.6-30.0)
NZ	14.5	(12.6-16.7)	26.0	(25.0-27.1)	29.1	(28.3-29.9)

High blood pressure

High blood pressure is one of the leading risk factors for worldwide deaths and is a major risk factor for cardiovascular disease including coronary heart disease and stroke (ischemic and haemorrhagic). According to WHO, the overall global prevalence of raised blood pressure was around 22% among adults aged 18 and over in 2014 (WHO, 2016). High blood pressure is usually defined as systolic blood pressure (SBP) 140mmHg or higher, or diastolic blood pressure (DBP) 90 mmHg or higher in adults (18+ years).

Burden of high blood pressure at country level, GBD 2010

The 2010 burden of all causes attributable to high systolic blood pressure by the IHME indicated that India and China had the highest rate of mortality, DALYs and years of life lost while New Zealand sat in the middle and Canada was leading. For YLDs, the UK held the highest rate, followed by Singapore. New Zealand had the lowest rate of years lived with disability attributable to higher blood pressure followed by China. Men had higher burden of health loss attributable to hypertension than women, for all countries on the list.

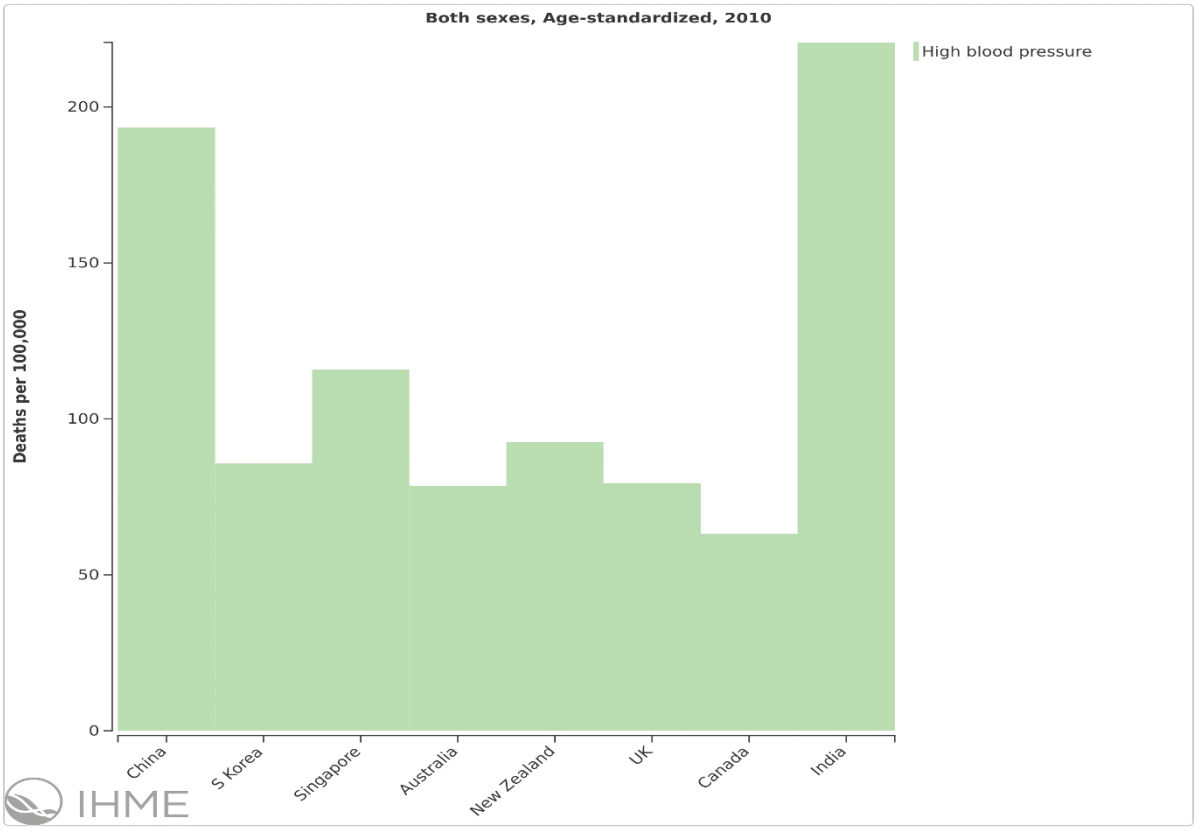


Figure 126 Age standardised mortality attributable to high blood pressure, by country, both sexes, GBD 2010

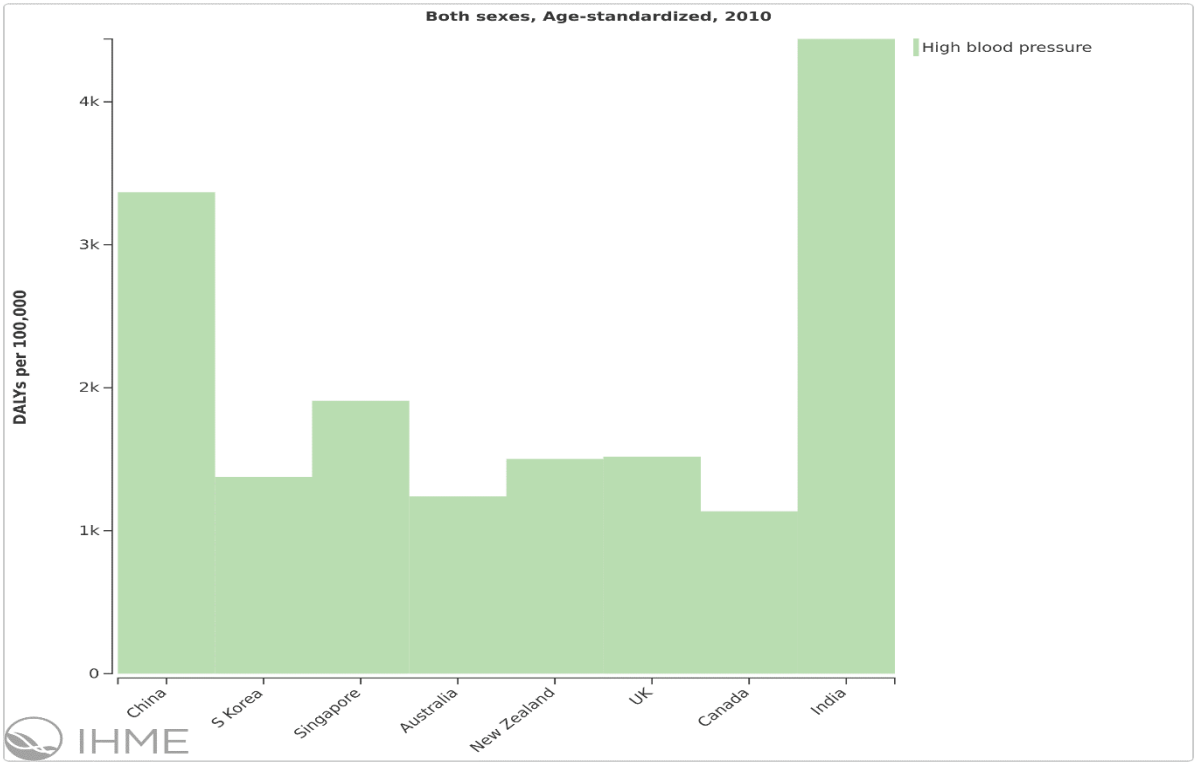


Figure 127 Age standardised DALYs attributable to high blood pressure, by country, both sexes, GBD 2010

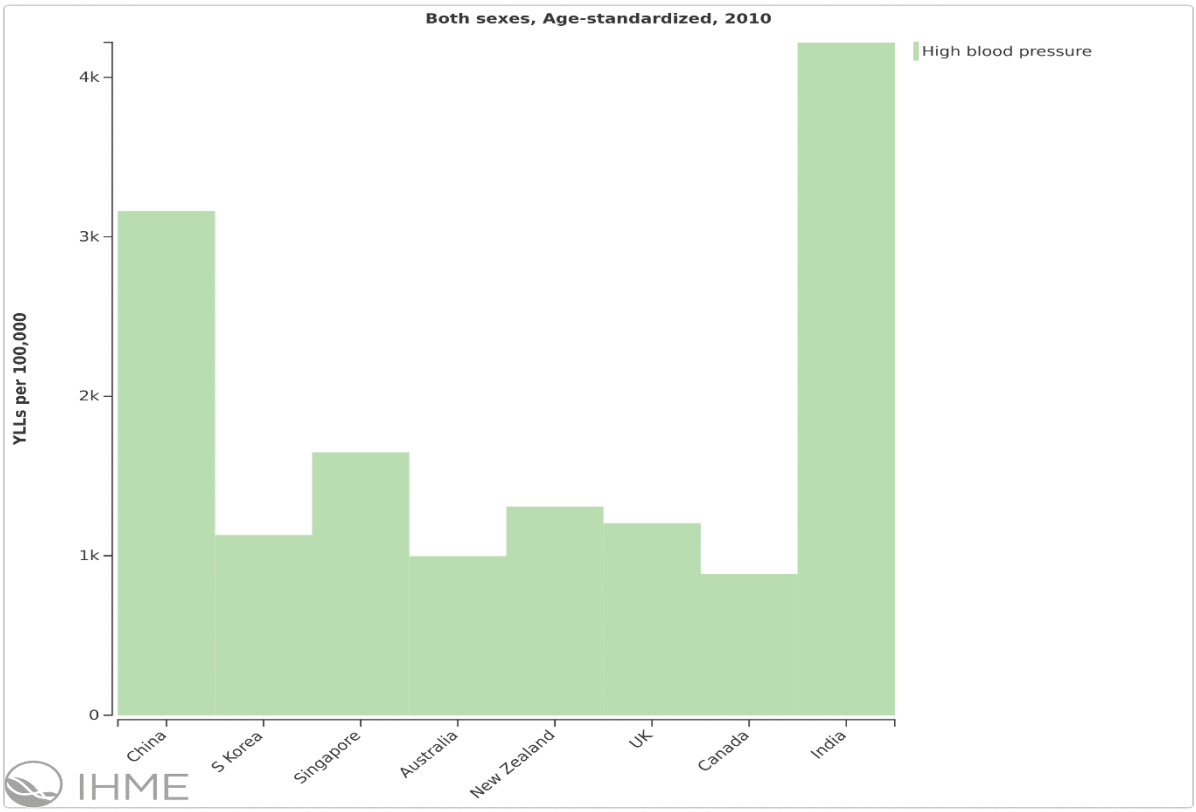


Figure 128 Age standardised YLLs attributable to high blood pressure, by country, both sexes, GBD 2010

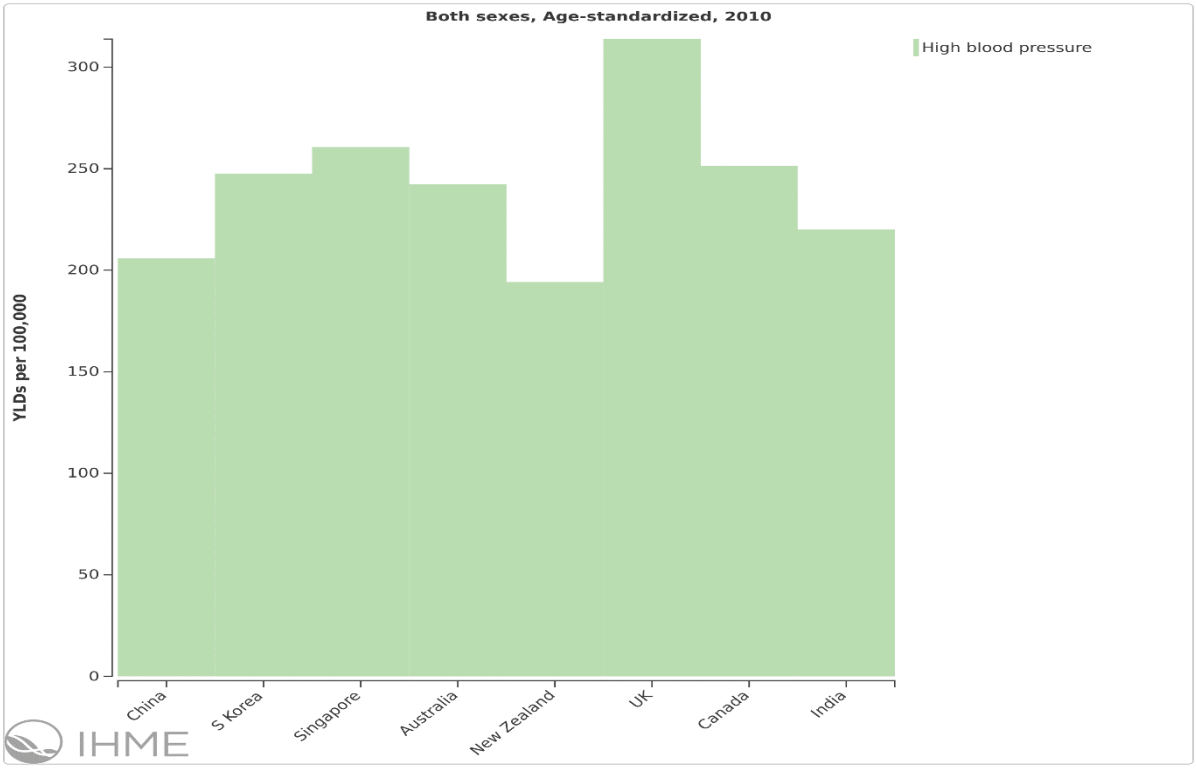


Figure 129 Age standardised mortality attributable to high blood pressure, by country, both sexes, GBD 2010

Table 109 All causes burden of disease attributable to high blood pressure, by country and sex, GBD 2010

	Country	Mortality			DALYs			YLLs			YLDs		
		Rate	95% UI		Rate	95% UI		Rate	95% UI		Rate	95% UI	
Female	Australia	66.4	51.5	85.9	891.0	739.5	1110.2	693.0	569.5	897.6	198.0	137.5	263.5
	Canada	53.1	37.9	71.8	841.8	676.8	1083.6	620.2	486.7	828.9	221.5	152.9	302.9
	China	163.3	137.9	188.5	2648.6	2294.9	2968.7	2445.6	2105.1	2755.8	203.1	142.4	272.1
	India	188.0	142.7	227.1	3482.4	2699.3	4214.9	3277.2	2476.5	3973.3	205.2	140.9	277.5
	New Zealand	77.1	60.7	97.4	1078.0	900.7	1318.8	911.6	759.7	1142.2	166.4	117.4	228.4
	Singapore	101.6	77.2	122.1	1452.8	1205.1	1700.9	1223.5	980.5	1451.8	229.3	160.1	315.2
	South Korea	80.8	65.8	100.5	1118.9	944.6	1389.5	902.0	757.9	1147.8	216.9	149.5	293.0
	United Kingdom	64.1	51.6	80.8	1172.8	1006.2	1405.4	870.0	748.2	1082.6	302.7	214.2	401.1
Male	Australia	91.4	74.8	106.1	1611.9	1397.8	1843.2	1321.7	1147.5	1482.7	290.2	205.5	392.6
	Canada	74.1	56.5	91.0	1453.5	1193.9	1717.9	1169.6	957.2	1385.5	283.9	199.9	385.6
	China	224.3	194.5	254.3	4087.0	3635.5	4530.0	3877.9	3438.6	4301.4	209.0	148.3	276.7
	India	254.6	206.2	307.4	5395.1	4418.1	6505.5	5160.0	4199.0	6266.4	235.1	155.8	325.0
	New Zealand	109.3	88.4	128.1	1963.6	1697.6	2232.5	1739.1	1497.3	1966.8	224.5	159.7	305.6
	Singapore	130.1	111.0	150.0	2393.2	2124.7	2668.8	2098.2	1856.7	2340.4	295.0	209.5	397.5
	South Korea	86.9	72.9	101.9	1641.9	1425.9	1863.9	1360.2	1183.5	1534.6	281.7	194.4	375.8
	United Kingdom	97.4	81.9	111.8	1904.0	1669.9	2139.5	1574.6	1374.7	1761.3	329.4	235.9	435.4

Prevalence of high blood pressure

The Global Health Observatory data of the WHO (WHO, 2016) indicated that India had the highest prevalence rate of hypertension followed by China and New Zealand in both 2010 and 2014 for adults aged 18+ years and both sexes combined, using the definition of raised blood pressure (SBP>=140 or DBP>=90). The Republic of Korea had the lowest rate of high blood pressure. There seemed to be an indication of reduced prevalence rates of raised blood pressure since 2010 for all the countries on the list even though the differences were not necessarily statistically significant. Men had a higher prevalence rate than women, and the difference was large for some countries such as New Zealand and Singapore (absolute difference in prevalence rate, approximately 6%).

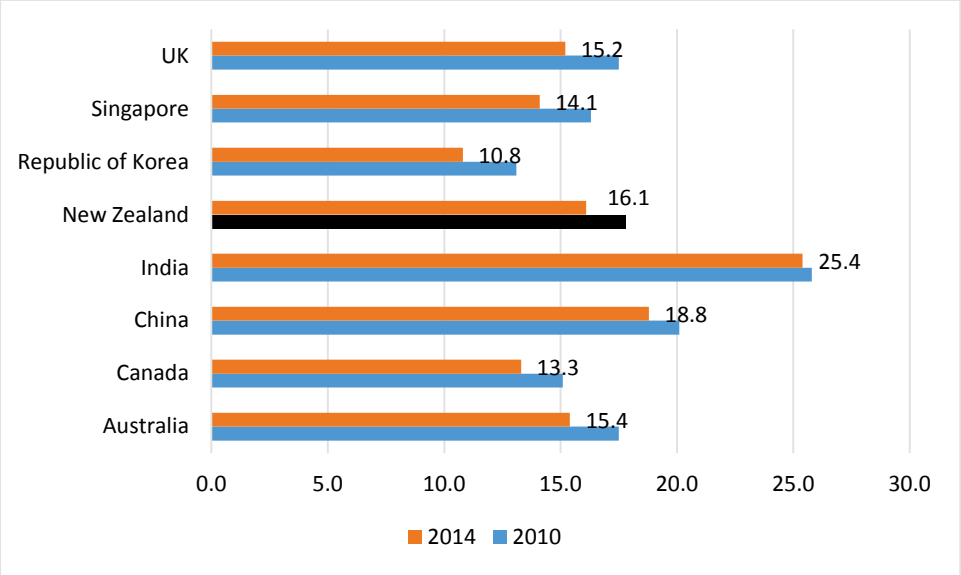


Figure 130 Age standardised prevalence of high blood pressure, 18+ years, by country, both sexes, WHO

Table 110 Age standardised prevalence of high blood pressure, 18+ years, by country and sex, WHO

Country	2014		2010	
	Female	Male	Female	Male
Australia	12.4 (8.2-17.2)	18.4 (12.5-25.1)	14.1 (10.8-17.9)	20.9 (16.3-25.9)
Canada	11.0 (6.8-16.3)	15.7 (9.8-22.4)	12.4 (9.0-16.5)	17.9 (12.9-23.1)
China	17.0 (11.1-24.6)	20.4 (13.6-29.0)	18.3 (13.8-23.6)	21.8 (16.5-27.5)
India	24.8 (17.4-32.9)	25.9 (18.1-34.4)	25.2 (20.0-30.8)	26.3 (20.7-32.3)
New Zealand	13.1 (8.6-18.9)	19.1 (13.0-26.7)	14.7 (11.0-19.1)	21.1 (16.1-27.1)
Republic of Korea	8.4 (5.1-12.6)	13.2 (8.1-19.6)	10.4 (7.4-13.9)	15.7 (11.4-20.8)
Singapore	11.1 (7.0-16.4)	17.2 (11.3-24.3)	13.0 (9.5-17.3)	19.6 (14.6-25.3)
UK	12.5 (8.8-16.9)	18.0 (12.5-23.8)	14.5 (11.6-17.6)	20.6 (16.8-24.7)

The Asian populations in Waitemata and Auckland DHBs had similar rates of hypertension to the New Zealand average (both sexes combined) using the definition of 'takes medication for high blood pressure', based on the NZHS 2011-13 data (Ministry of Health, 2016). Of note, these rates are lower than the New Zealand average using the WHO data: the NZHS data was for adults 15+ years and medicated hypertension only. If NZHS data for hypertension could be translated to figures

comparable with the WHO estimates, Asians in both DHBs would likely be still similar to the New Zealand average, suggesting a position better than India and China, but worse than the Republic of Korea and comparable to Australia and the UK.

Table 111 Age standardised prevalence of hypertension (taking medications), 15+ years, both sexes, NZHS 2011-13

DHB	Asian		European/Other		All	
	Rate	*(95% CI)*	Rate	*(95% CI)*	Rate	*(95% CI)*
Waitemata	10.8	(5.9-17.8)	9.4	(7.5-11.5)	10.5	(8.4-12.9)
Auckland	10.6	(7.9-13.9)	8.7	(6.5-11.4)	10.1	(8.5-11.9)
Counties-Manukau	12.8	(9.3-17.0)	12.9	(9.8-16.6)	13.6	(11.8-15.5)
All 3 Auckland DHBs	12.0	(9.9-14.3)	10.0	(8.7-11.5)	11.3	(10.2-12.5)
NZ	11.5	(9.8-13.3)	11.0	(10.5-11.6)	11.7	(11.3-12.2)

Low physical activity

WHO defines physical activity as 'any bodily movement produced by skeletal muscles that requires energy expenditure – including activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits' (WHO, 2016). Insufficient physical activity is a key modifiable risk factor for many non-communicable diseases including cardiovascular diseases, cancer and diabetes. There were dedicated efforts made by WHO and its member states on primary prevention of NCDs through physical activity - the 'Global Recommendations on Physical Activity for Health', was published by WHO in 2010. In addition, physical activity was part of the "Global Strategy on Diet, Physical Activity and Health", which was adopted by the World Health Assembly in 2004. The WHO recommends (WHO, 2016):

Table 112 WHO recommendations of physical activity

Children and adolescents aged 5-17years	Should do at least 60 minutes of moderate to vigorous-intensity physical activity daily
	Physical activity of amounts greater than 60 minutes daily will provide additional health benefits
	Should include activities that strengthen muscle and bone, at least 3 times per week
Adults aged 18–64 years	Should do at least 150 minutes of moderate-intensity physical activity throughout the week, or do at least 75 minutes of vigorous-intensity physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity
	For additional health benefits, adults should increase their moderate-intensity physical activity to 300 minutes per week, or equivalent
	Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week
Adults aged 65 years and above	Should do at least 150 minutes of moderate-intensity physical activity throughout the week, or at least 75 minutes of vigorous-intensity physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity
	For additional health benefits, they should increase moderate intensity physical activity to 300 minutes per week, or equivalent
	Those with poor mobility should perform physical activity to enhance balance and prevent falls, 3 or more days per week
	Muscle-strengthening activities should be done involving major muscle groups, 2 or more days a week

Burden of low physical activity at country level, GBD 2010

India had higher mortality and YLL rates attributable to low physical activity (mortality rate 50.3 per 100,000; 95%UI: 41, 60) and New Zealand had rates comparable to other countries, with Canada was the leader. For DALYs attributable to low physical activity, Singapore stood out, following closely behind India, while Canada still had the lowest rate. For years lived with disability attributable to low physical activity, Singapore had the highest burden; India and China had the lowest rates followed by New Zealand. It is not known if this reflected more serious or fatal health loss in India and China, or in other words, better survival and health care services in Singapore. Again, men had a higher burden of health loss attributable to low physical activity than women.

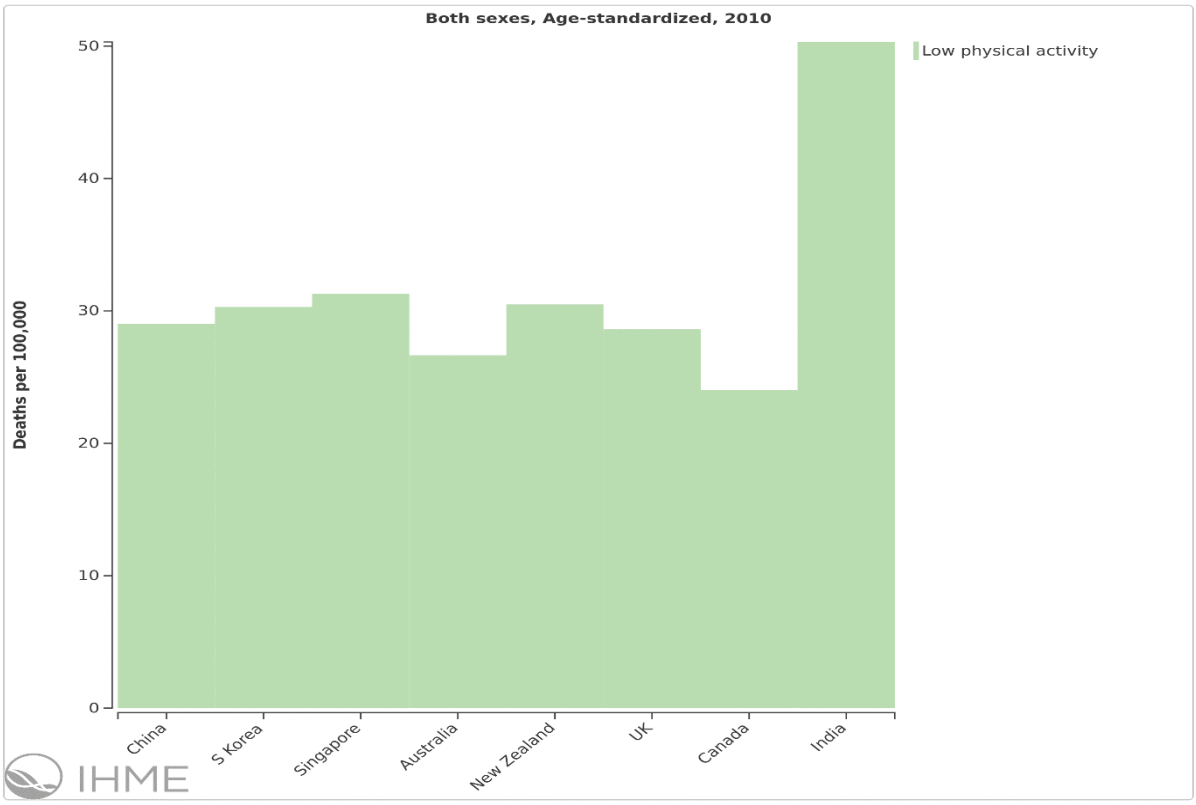


Figure 131 Age standardised mortality attributable to low physical activity, by country, both sexes, GBD 2010

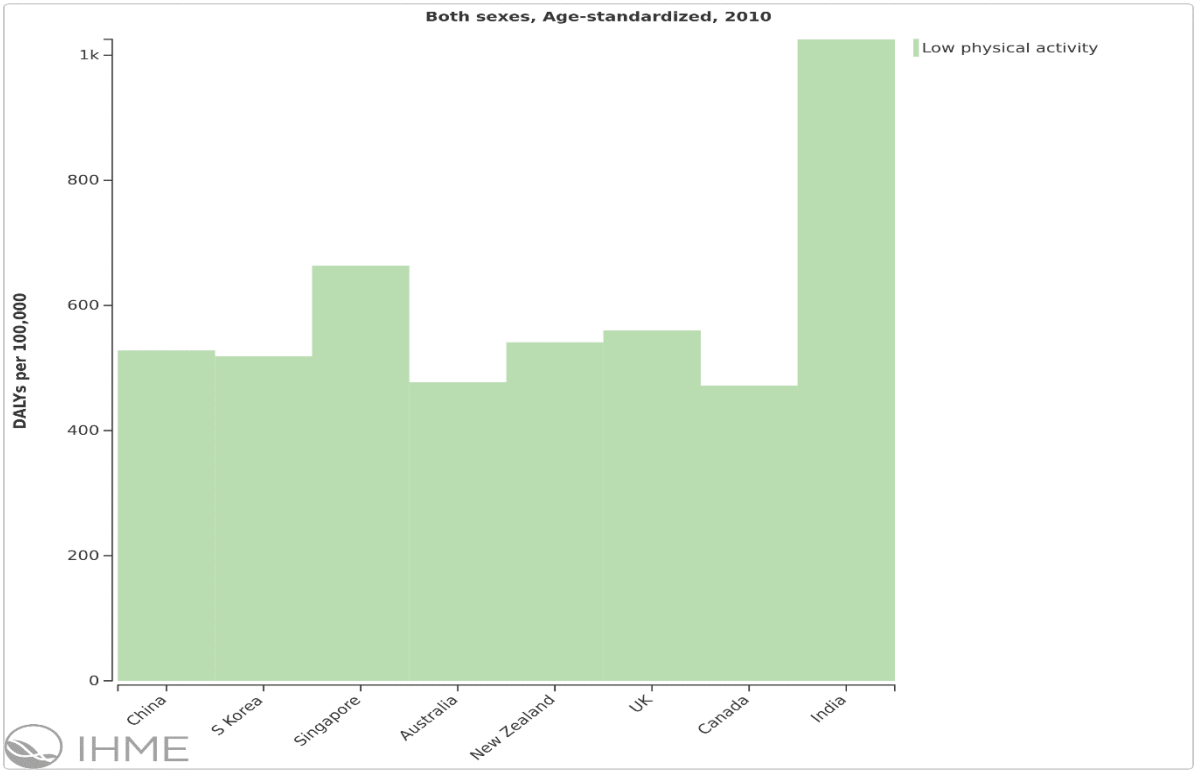


Figure 132 Age standardised DALYs attributable to low physical activity, by country, both sexes, GBD 2010

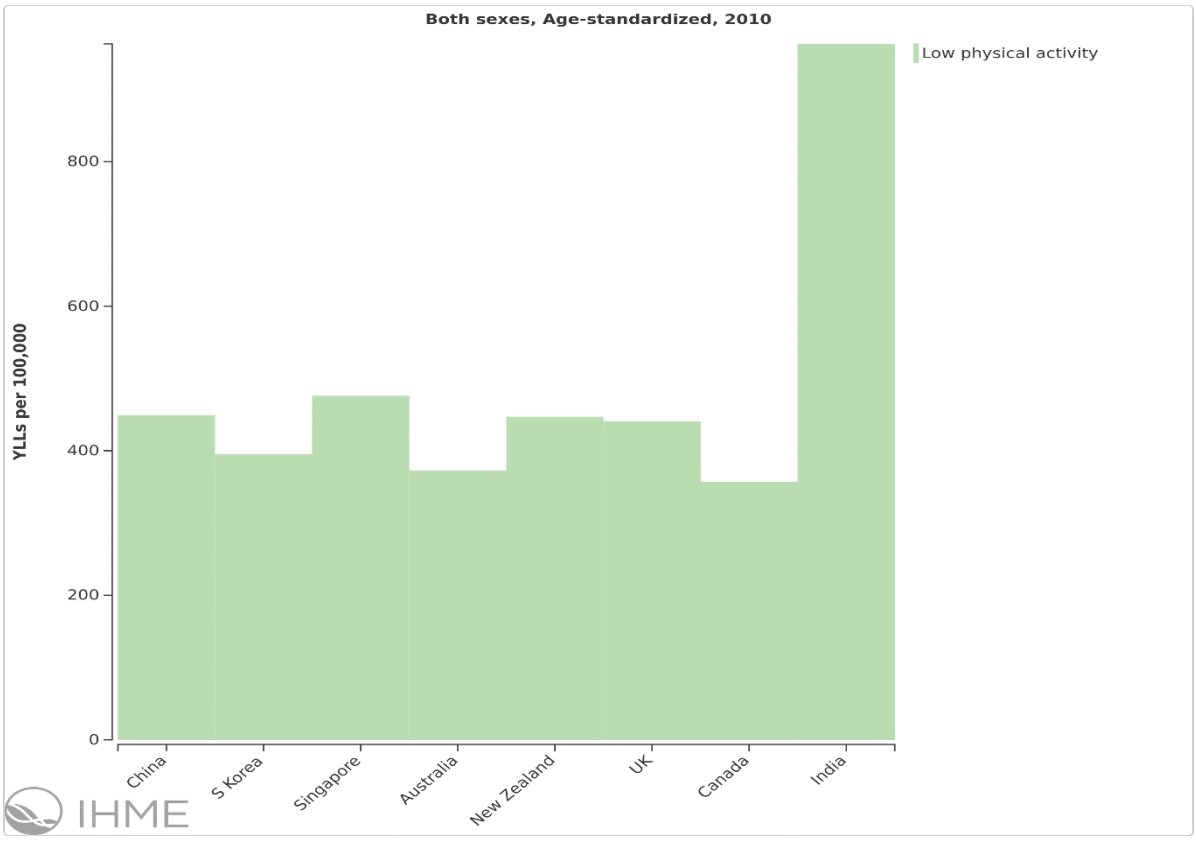


Figure 133 Age standardised YLLs attributable to low physical activity, by country, both sexes, GBD 2010

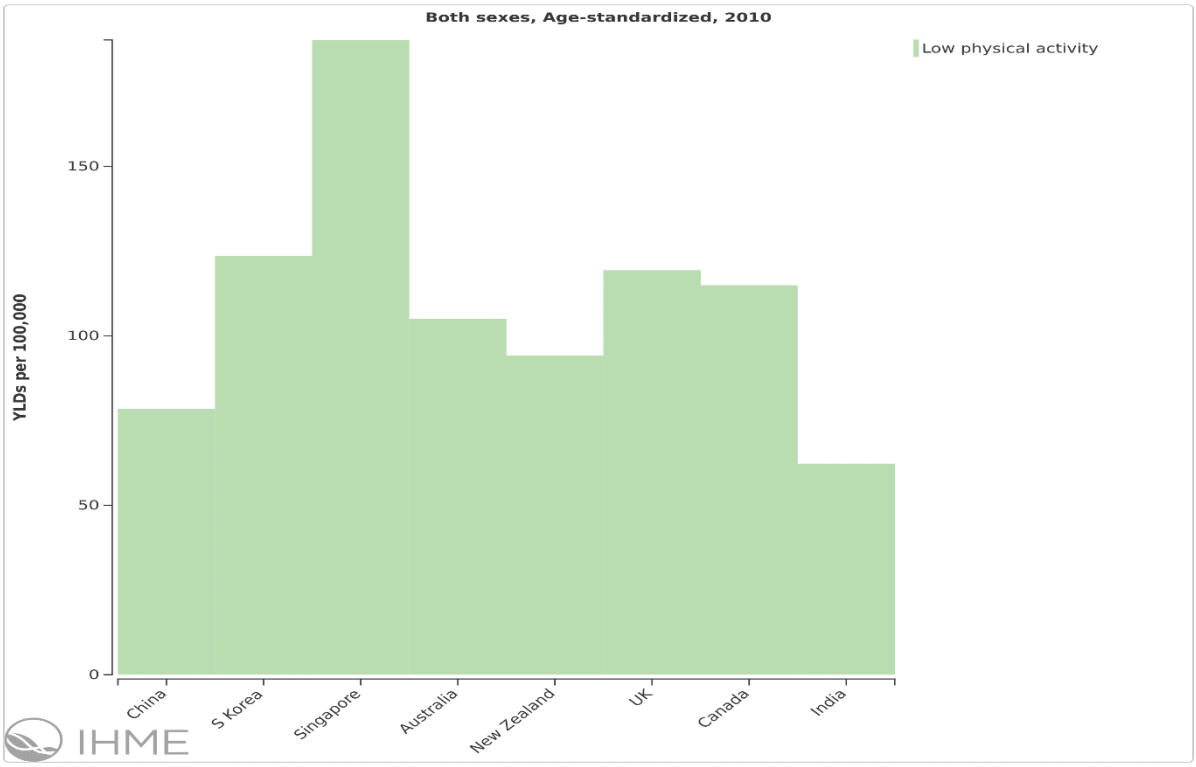


Figure 134 Age standardised YLDs attributable to low physical activity, by country, both sexes, GBD 2010

Table 113 All causes burden of disease attributable to low physical activity, by country and sex, GBD 2010

	Country	Mortality			DALYs			YLLs			YLDs		
		Rate	95% UI		Rate	95% UI		Rate	95% UI		Rate	95% UI	
Female	Australia	24.0	20.5	29.5	393.4	338.3	466.9	298.5	260.1	361.0	95.0	61.3	136.5
	Canada	20.8	17.5	25.4	379.3	311.8	459.5	276.9	237.9	337.6	102.4	65.8	151.4
	China	22.9	17.8	27.5	383.7	308.5	461.1	317.7	249.2	384.6	66.0	39.6	101.2
	India	34.9	26.5	43.7	637.3	491.1	796.8	588.5	446.8	745.3	48.8	30.1	74.2
	New Zealand	27.4	23.4	32.1	455.3	389.2	534.8	362.3	316.6	425.2	93.0	57.3	138.8
	Singapore	26.3	21.9	30.5	498.0	413.6	597.3	348.1	296.8	403.2	149.9	91.6	229.7
	South Korea	27.2	22.3	33.6	409.3	335.3	502.3	309.8	260.3	378.3	99.6	64.3	146.8
	United Kingdom	25.2	21.8	30.7	463.6	399.8	552.1	350.6	308.8	422.5	113.0	74.9	158.8
Male	Australia	29.3	25.3	33.9	566.1	486.5	655.9	450.1	391.3	521.8	116.0	74.0	166.9
	Canada	27.6	23.5	32.2	573.1	481.4	684.0	444.1	380.3	519.2	129.0	83.1	186.0
	China	35.6	27.4	42.5	674.4	528.9	816.7	583.7	453.5	702.2	90.7	56.3	137.1
	India	66.9	53.6	81.6	1423.8	1132.1	1763.8	1347.9	1064.6	1681.3	75.9	47.6	112.1
	New Zealand	33.7	29.0	39.0	634.3	540.2	736.2	538.6	462.6	624.8	95.7	58.8	145.1
	Singapore	37.0	31.7	42.6	843.9	699.2	999.6	615.1	526.0	718.2	228.8	138.6	348.4
	South Korea	33.9	28.6	39.2	648.3	540.3	760.7	495.8	422.4	569.5	152.5	98.6	219.9
	United Kingdom	32.2	27.7	37.7	663.8	563.5	780.0	537.4	463.7	635.1	126.4	83.2	181.1

Prevalence of low physical activity

New Zealand had the highest rate of being 'insufficiently active' among adults aged 18+ years followed by the UK in 2010, while India had the lowest rate. It is also true when the data was stratified by sex. In addition, women had higher rates of low physical activity than men.

In the NZHS, New Zealand measures the proportion of people meeting the New Zealand physical activity guidelines in the past 7 days among adults 15+ years, i.e. did at least 30 minutes of exercise on 5 or more days in the past week. The New Zealand average for women and men combined in NZHS 2011-13 was 46.0% not meeting the guideline (95%CI: 44%-48%). Acknowledging the differences in years of comparison, age group and definitions of physical activity between NZHS and the WHO estimates, the New Zealand average is slightly higher than the WHO estimate for New Zealand.

Asian in both DHBs had higher rates not meeting the New Zealand guideline for physical activity than the New Zealand average (Waitemata Asian: 68.5%, 95%CI: 59%-79%; Auckland DHB Asian: 54.8%, 95%CI: 49%-61%). In the international context, the Asian in Waitemata and Auckland DHBs would replace the New Zealand average of the regions with the highest rate of insufficient activity, particularly for Waitemata DHB. Nationwide, lower (crude) rates of being physically active were reported among Chinese (40%), South Asian (46%) and Other Asian (46%), compared to European/Other (56%) in the NZHS 2011-13 (Scragg, 2016).

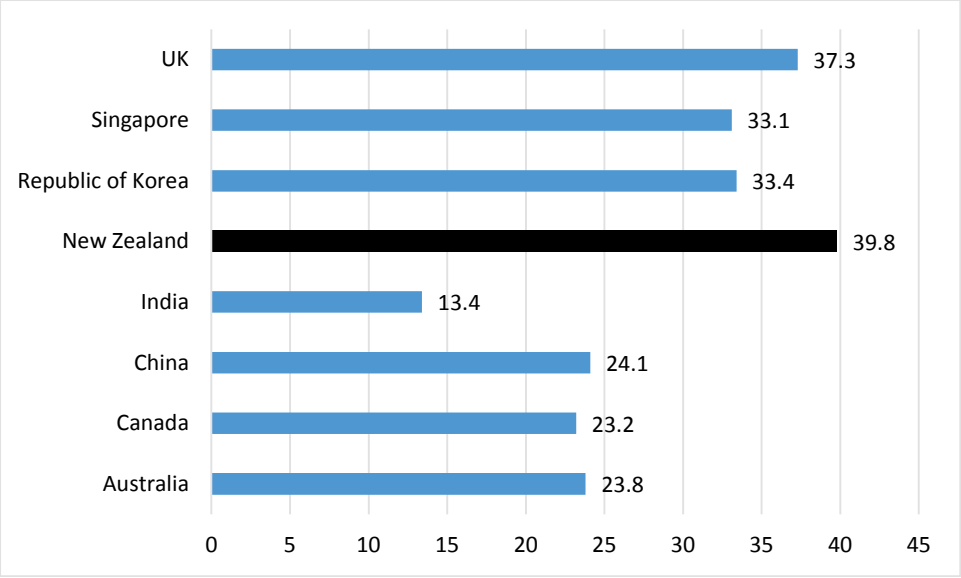


Figure 135 Age standardised prevalence of low physical activity, 18+ years, by country, both sexes, WHO

Table 114 Age standardised prevalence of low physical activity, 18+ years, by country and sex, WHO

Country	Both sexes	Female	Male
Australia	23.8 (6.4-58.9)	27.6 (7.5-63.2)	20.1 (5.9-55.8)
Canada	23.2 (6.1-57)	26.2 (6.9-60.4)	20.3 (5.9-55.6)
China	24.1 (21.7-26.5)	25.6 (22.3-29.1)	22.5 (19.2-26.1)
India	13.4 (12.2-14.8)	16.1 (14.3-17.9)	10.8 (9-12.9)
New Zealand	39.8 (37.5-42.0)	43.7 (40.3-47.2)	35.8 (32.9-38.8)
Republic of Korea	33.4 (10.2-71)	37.9 (12.1-74.5)	28.9 (9.5-69.2)
Singapore	33.1 (30.7-35.5)	35.3 (31.7-39.1)	30.9 (27.8-34.2)
UK	37.3 (35.9-38.8)	42.4 (40.3-44.6)	32.3 (30.4-34.2)

Table 115 Age standardised prevalence meeting physically active criteria* of New Zealand, 15+ years, NZHS 2011-13

DHB	Asian		European/Other		All	
	Rate	*(95% CI)*	Rate	*(95% CI)*	Rate	*(95% CI)*
Waitemata	30.5	(21.2-41.2)	48.3	(44.7-51.9)	45.2	(41.4-49.1)
Auckland	45.2	(39.1-51.4)	53.7	(49.6-57.8)	50.2	(46.6-53.8)
Counties-Manukau	38.1	(32.6-43.7)	38.5	(32.0-45.4)	37.2	(32.6-42.0)
All 3 Auckland DHBs	38.6	(34.4-42.8)	47.7	(45.1-50.4)	44.4	(42.0-46.9)
NZ	42.0	(38.6-45.4)	56.6	(54.2-59.0)	54.0	(51.8-56.1)

* Met physical activity guidelines in past 7 days, i.e. did at least 30 minutes of exercise on 5 or more days in the past week

Health service use

In this section, children's immunisation coverage rates and cervical and breast screening programmes are benchmarked internationally.

Immunisation rate of children

WHO and UNICEF regularly review data available on national immunisation coverage based on data officially reported to WHO and UNICEF by Member States as well as data reported in the published and grey literature, and then estimate immunisation coverage by country, using established methods and processes (Anthony Burton, 2009). New Zealand did reasonably well in immunisation coverage rates, but China and the Republic of Korea were the leaders. Of note, there were still gaps for India to bridge according to 2014. Not all countries had the same immunisation schedule.

Table 116 Immunisation coverage rate, WHO 2014

Vaccine	Australia	Canada	China	India	New Zealand	Republic of Korea	Singapore	UK
BCG			99	91		99	99	
DTP1	92	98	99	90	93	99	98	98
DTP3	92	96	99	83	93	99	97	95
HepB_BD			94	37		92	67	
HepB3	91	75	99	70	93	99	97	
Hib3	91	96		20	93	97		95
MCV1	93	95	99	83	93	99	95	93
MCV2	93	94	99	51	86	96	95	89
PAB				87				
PCV3	91	97			93			93
Pol3	92	96	99	82	93	99	97	95
Rota_last	84							

Data source: http://www.who.int/immunization/monitoring_surveillance/routine/coverage/en/index4.html, accessed 28 March 2016, as of 10 July 2015

Notes by WHO:

1 BCG Baccille Calmette Guérin vaccine
2 DTP1 First dose of diphtheria toxoid, tetanus toxoid and pertussis vaccine
3 DTP3 Third dose of diphtheria toxoid, tetanus toxoid and pertussis vaccine
4 HepB_BD Hepatitis B birth dose estimates are for doses given within 24 hours after birth
5 HepB3 Third dose of hepatitis B vaccine
6 Hib3 Third dose of Haemophilus influenzae type B vaccine
7 MCV1 Measles-containing vaccine
8 MCV2 Coverage estimates are for the nationally recommended age for the second dose of measles containing vaccine.
9 PAB Protection at birth
10 PCV3 Third dose of pneumococcal conjugate vaccine
11 Pol3 Third dose of polio vaccine
12 Rota_last Rotavirus last dose (2nd or 3rd depending on schedule)

At the end of 2014, Asian in both DHBs generally had higher immunisation coverage rates than the New Zealand average, close to the level of China (***Figure 136***). In New Zealand, the vaccines currently included in the 8 month old Immunisation Health Target are (Ministry of Health, 2016): Diphtheria, Tetanus, Pertussis, HIB (Haemophilus influenzae type B), Polio, HepB, Pnemococcal and Rotavirus.

As at 30 June 2016, Asian children in both Auckland and Waitemata DHBs maintained immunisation coverage rates which are higher than the New Zealand immunisation coverage rate (92.7%) at the level of China in 2014 (Figure 136). In New Zealand, the vaccines currently included in the 8 month old Immunisation Health Target are (Ministry of Health, 2016): diphtheria, tetanus, pertussis, Hib (Haemophilus influenzae type B), polio, HepB, pneumococcal and rotavirus. The Asian coverage rate at 8 months is 97% (Auckland DHB) and 98% (Waitemata DHB) as at 30 June, 2016.

At age 15 months, children are offered booster doses of pneumococcal and Hib vaccines, and a first dose of MMR vaccine. The Asian coverage rate at 2 years is 95% (Auckland DHB) and 97% (Waitemata DHB) as at 30 June, 2016. At age 4 years, booster doses of diphtheria, tetanus, pertussis and polio vaccines, and a second dose of MMR vaccine. Overall, Asian children generally maintain immunisation coverage levels of greater than the recommended 95%, at both 8 months and 2 years, with the exception for the 4-year-old immunisation event, where coverage is 88% (Auckland DHB) and 90% in (Waitemata DHB) fully vaccinated by 5 years. This is still higher than the DHB total 4-year-old coverage rate generally, which is 86% (Auckland DHB) and 83% (Waitemata DHB).

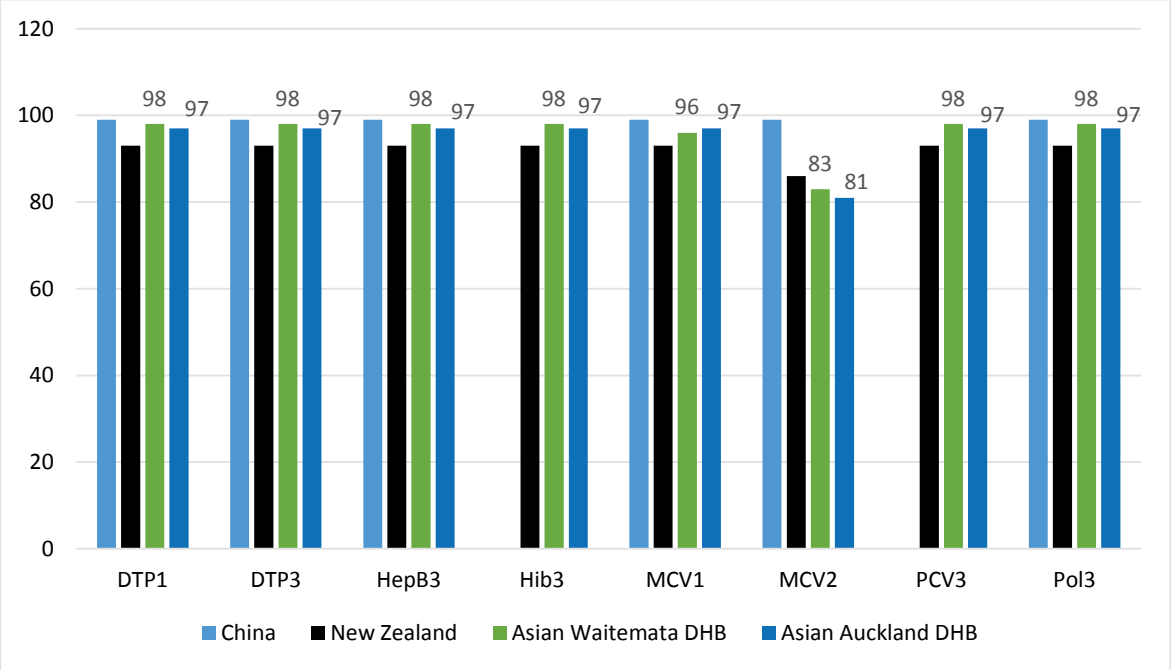


Figure 136 Immunisation coverage rate (%), Asian of Waitemata and Auckland DHBs, 2014

Cervical screening

The International Cancer Screening Network (ICSN) of the National Cancer Institute within the National Institutes of Health provided estimates of cervical screening based on an international survey (ICSN, 2016). In addition, organisations, policies and reach of the cervical screening programmes were also collected (**Table 117**). The New Zealand National Cervical Screening Programme (NCSP) started in 1991 and did very well as compared to the other countries on the list, with the coverage rate being 75% just behind the UK.

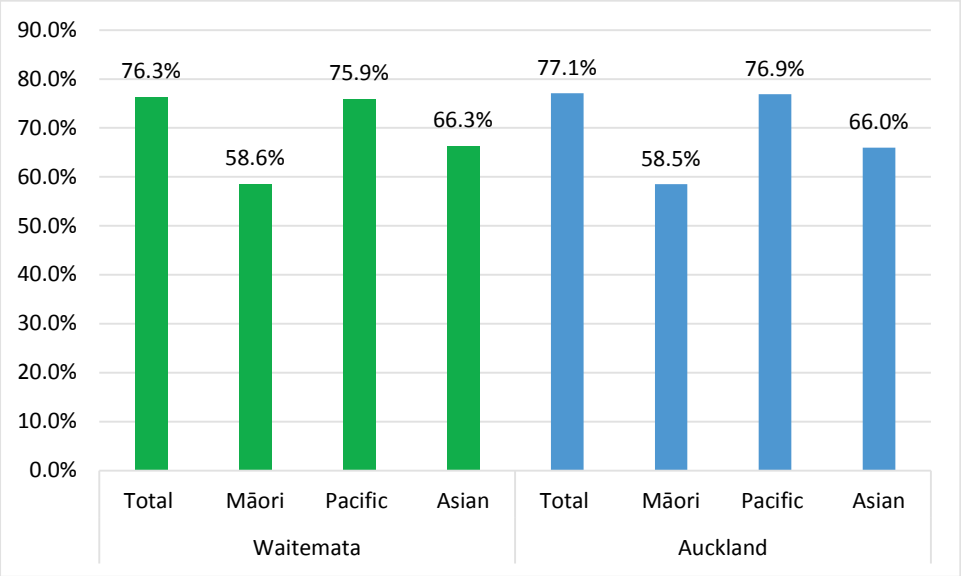
At the end of December 2015, the New Zealand average cervical screening coverage rate was 76.7% (three-year coverage) for women aged 25-60 years (official age group for reporting) (NCSP, 2016). As at 31 December 2010, Asian in Auckland DHB and Waitemata DHB had screening rates of 52.4% and 52.9% respectively (NCSP, 2016). Compared to the figures of other countries of the same time period, the Asian rates in both DHBs were lower than that of the averages of New Zealand, the UK and Australia. As at December 2015, the rates increased to be 66% for Asian women in both DHBs.

Since February 2016, the NCSP has used the ethnicity and domicile recorded on the Ministry of Health's National Health Index (NHI) instead of ethnicity and domicile information from the National Cervical Screening Register. In 2018, the NCSP plans to change the first step in the screening pathway from liquid-based cytology screening to 'primary human papillomavirus (HPV) screening'.

Table 117 Cervical Cancer Screening Programmes by country in 2012: Organization, Policies, and Programme Reach*

Country	Program Type[1]	Year Program Began	Detection Methods[2]	Follow-Up Procedure[3]	Age Groups Covered	Recommended Interval for Average Risk	Number of Women Screened (2010)	Participation Rate (2010)
Australia	NS	1991	PC		20-69	2	1,896,259	57.4%
Canada	NS	1960	PC, PLC[4]	HPV-T	21-69	2, 3 [5]	4,384,221	35.1-72.0% [6]
China	N	2009	PC, PLC, VILI/VIA		35-59	3	4,000,000	50.0%
Korea	N	1988	PC		30-70+	2	2,357,750	30.3%
New Zealand	N	1991	PC, PLC		20-69	3	426,033	75.2%
UK	N	1988	PLC	HPV-T	25-49	3	3,390,000	78.6%
					50-64	5		

*Data are from a survey of ICSN (International Cancer Screening Network) country representatives, conducted in 2012
Data source: http://healthcaredelivery.cancer.gov/icsn/cervical/screening.html, accessed 28 March 2016
Notes:
1 Program Types:
N (National screening policy with national program implementation)
NS (National screening policy with state/provincial/regional screening program implementation)
S (State/Provincial/Regional screening and program implementation)
O (Other)
2 Detection Methods:
PC (Pap test, conventional cytology)
PLC (Pap test, liquid-based cytology)
HPV-P (HPV test primary screening)
3 Follow-Up Procedure:
HPV-T (HPV test triage)
4 Detection methods vary by provincial program
5 Interval varies by provincial program
6 Represents data from the following provincial screening programs: British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, and Saskatchewan.
7 Denotes an estimate for the number of women screened for cervical cancer who qualify for the National Breast and Cervical Cancer Early Detection Program
Last Updated: 01 Feb 2016



Data source:
https://www.nsu.govt.nz/system/files/page/dec_2015_ncsp_coverage_new_vs_old_method_final_0.docx+&cd=1&hl=en&ct=clnk&gl=nz, accessed 28 March 2016

Figure 137 Cervical screening coverage rate (%), Waitemata and Auckland DHBs, December 2015

Breast screening

New Zealand had a reasonably good breast screening coverage rate at 67.5% in 2010, according to the International Cancer Screening Network (ICSN, 2016). The screening rate in the two years ending 31 December 2015 was 70.9% for women aged 50-69 years in New Zealand (NSU, 2016). The rates were approximately 72% and 66% for Asian women in Auckland and Waitemata DHBs respectively in the two years ending 30 June 2016. There were still some gaps for Waitemata Asian women to reach the New Zealand average or the UK's average, although they possibly did better than Canada and the Republic of Korea in 2010.

Table 118 Breast Cancer Screening Programmes by country in 2012: Organization, Policies, and Programme Reach*

Country	Program Type[1]	Year Program Began	Year in which 100% national screening was or will be achieved:	Detection Methods in Routine Use[2]	Detection Methods being Evaluated for Possible Use	Age Groups Covered	Recommended Interval for Average Risk for Mammography		Number of Women Screened (2010)	Participation Rate (2010)
							Age 40-49	Age 50+		
Australia	NS	1991		MM, DM		40-75+	2 years	2 years	data not available	data not available
Canada	NS	1988		MM, DM, CBE[3]	3-D Ultrasound	50-69	1 year[4]	2 years	196,187	47.3%
China	NS	2009		MM, CBE, U	DM, MRI, CT, T	40-59	3 years	3 years	1,200,000	data not available
Korea	N	1999	2002	MM, DM	DM	40-75+	2 years	2 years	2,602,928	39.3%
New Zealand	N	1998	1999	MM, DM		45-69	2 years	2 years	211,922	67.5%
UK	N	1988	1995	MM, DM		50-69		3 years	1,957,124	73.3%

*Data are from a survey of ICSN country representatives, conducted in 2012

Notes:

1 *Program Types:*

N (National screening policy with national program implementation)

NS (National screening policy with state/provincial/regional screening program implementation)

S (State/Provincial/Regional screening and program implementation)

O (Other)

3 *Two of the 12 programs offer CBE or modified CBE in some facilities.*

4 *One province does screen the 40-49 age group*

2 *Detection Methods:*

MM (screen-film mammography)

DM (digital mammography)

T (Tomosynthesis/3-D mammography)

CBE (clinical breast exam)

BSE (breast self-examination)

MRI (Magnetic Resonance Imaging)

U (ultrasound)

CT (Computerized Tomographic Imaging)

Table 119 Breast Cancer Screening coverage, Asian, Waitemata and Auckland DHBs

Reporting Period	DHB	Asian Women screened (50-69 yrs)	Population Projections (50-69 yrs)	Coverage (50-69 yrs)	Asian Women screened (45-69 yrs)	Population Projections (45-69 yrs)	Coverage (45-69 yrs)
1 July 2012 - 30 June 2014	Auckland	8,329	11,260	74.0%	12,111	15,950	75.9%
1 July 2012 - 30 June 2014	Waitemata	6,281	9,910	63.4%	8,932	13,950	64.0%
1 July 2013 - 30 June 2015	Auckland	8,787	11,970	73.4%	12,592	16,780	75.0%
1 July 2013 - 30 June 2015	Waitemata	6,961	10,610	65.6%	9,684	14,750	65.7%
1 July 2014 - 30 June 2016	Auckland	9,226	12,840	71.9%	12,881	17,750	72.6%
1 July 2014 - 30 June 2016	Waitemata	7,577	11,430	66.3%	10,432	15,780	66.1%

Data extracted from the BSA Database on 1 August 2016 (using 2015 update of the Population projections)

Other health service use

In this section, an overview of the Asian Health in Aotearoa in 2011-2013: Trends since 2002-2003 and 2006-2007 report (Scragg, 2016) of health service utilisation is included, along with coverage rates of children's immunisation, and cervical and breast screening programmes benchmarked internationally.

Asian Health in Aotearoa in 2011-2013: Trends since 2002-2003 and 2006-2007 Findings of health service utilisation

- Asian adults were less likely to have a usual health practitioner or service to visit when unwell (South Asian 88%, Chinese 87%, Other Asian 82%), compared to non-Asians (Māori 93%, Pacific 95%, European & Other 95%)
- The proportion of Asian children attending a public hospital increased from 2006-07 (14%) to 2011-13 (24%), while the proportion attending a private hospital decreased (from 2% to 0.1%)
- South Asian and Chinese children (both 74%) were less likely to have visited a dentist or oral health care worker in the last 12 months than European & Other (83%), who were similar to Other Asian
- Among adults, South Asian (31%), Chinese (36%) and Other Asian people (41%) were less likely to have visited a dentist or oral health care worker in the last 12 months than European & Other (49%)

Health service provider perspectives of Asian consumers

Section 21 of the 'Health Needs Assessment of Asian People Living in the Auckland Region' report (Mehta, 2012) outlines health service provider interviews summarised under the following key themes areas:

Table 120 Health service provider perspectives of Asian consumers

Themes	Summary of Provider Comments
Key issues concerning the health needs of Asian communities in Auckland	• Lack of preventive behaviours such as healthy eating and adequate exercise and high anecdotal prevalence of smoking • High and increasing burden of CVD and diabetes among South Asian people • Significant burden of mental health issues coupled with lack of awareness among Asian communities about mental illness and available services • Reluctance to access residential care facilities for older Asian people, and the occurrence of elder abuse • Delayed service access by Asian families affected by disability due to stigma and lack of awareness of available services • Sexual health issues, particularly around increasing termination of pregnancy rates among Asian students • Family violence • Significant immigration and settlement stress.
Key cultural differences	• Asian cultures tend to be hierarchical and collectivistic • Religion is generally important to Asian people • Certain health issues, such as mental illness, family violence and disability, are very stigmatised in Asian communities. • Asian people tend to be proactive about seeking health care for non-stigmatised conditions, have high expectations of health providers and frequently utilise alternative therapies • There are distinct gender roles in many Asian cultures.
Barriers to appropriate health care	• Language • Lack of knowledge of the New Zealand health system • Cultural differences in assessment and treatment leading to assumptions by health professionals and Asian patients during medical interactions about the medical care that will be provided, and the knowledge of the other party • Lack of cultural competency among health professionals • Stigmatisation associated with health issues

Themes	Summary of Provider Comments
	such as mental illness and disability • Concerns about lack of confidentiality • Transport and cost issues.
Facilitators to appropriate health care	• Education about the New Zealand health system and other health-related education • Health promotion around preventive behaviours and key health issues • Improving the cultural competence of health professionals and services • Development of the Asian health workforce • Inpatient supports for Asian patients (cultural support and interpreting services) as well as community support groups • Providing targeted services for Asian communities in Auckland, such as the South Asian diabetes nurse practitioner in ADHB • Co-ordination and linkage of health services for Asian people • Obtaining regular feedback from Asian communities about health services.
Unmet needs	• More targeted health promotion for preventive behaviours and specific health issues such as CVD and diabetes, and further health education around the structure of the New Zealand health system • Greater prioritisation of Asian health needs where appropriate, including adequate monitoring of Asian health outcomes • Improved cultural competence of services • Adequate development of the Asian health workforce • Improved availability and access to mental health services • Greater co-ordination of disability services and culturally appropriate respite care for Asian families • Increased awareness and early intervention for family violence • Greater collaboration between health services regarding care for Asian people in Auckland, particularly around evaluation and planning of services • Improved opportunities for overcoming social isolation among Asian migrants.

Asian of Australia

Australia does not collect ethnicity information in the social and health sector in a systematic way as New Zealand does. Country of birth is now used as a proxy for ethnicity, but a limitation is that it does not count the people born in Australia who are self-identified as Asian or Asian sub-groups.

Asian population in Australia

Persons born in the United Kingdom was the largest group of overseas-born residents, accounting for 5.1% of Australia's total population, followed by peoples born in New Zealand (2.6%), China (2.0%), India (1.8%) and the Philippines and Vietnam (both 1.0%) (ABS, 2016). Refer to Appendix 5 for the classification of Asian countries according to Standard Classification of Countries of Australia. This has key implications in explaining the health statistics when country of birth is used as a proxy in place of ethnicity.

Table 121 Top ten countries of birth estimated resident population, Australia, as at 30 June 2015 [(a) (b)(c)]

Country of birth	Population	% of Australian population
United Kingdom [(d)]	1,207,000	5.1
New Zealand	611,400	2.6
China [(e)]	*481,800*	*2.0*
India	*432,700*	*1.8*
Philippines	*236,400*	*1.0*
Vietnam	*230,200*	*1.0*
Italy	198,200	0.8
South Africa	178,700	0.8
Malaysia	*156,500*	*0.7*
Germany	125,900	0.5

Notes (a) Estimates are preliminary. (b) Top 10 countries of birth excluding Australia. (c) All population figures presented in this table are rounded. Estimates of the proportion of the Australian population are based on unrounded numbers. (d) United Kingdom, Channel Islands and Isle of Man. (e) Excludes SARs and Taiwan.
Data source:
http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/3FA175EA6651F2CACA25776E00178CAA?opendocument, accessed 27 April 2016

The age and sex characteristics of the Australia-born and the overseas-born show two very different populations, according to Australian Bureau of Statistics (ABS, 2016). The age groups with the highest proportions of the male and female overseas-born population were 25-29 years, 40-44 years and 45-49 years. The lowest proportions of overseas-born females and males were those aged 0-4 years, 5-9 years and those aged 85 years and over.

On the other hand, for Australia-born peoples, the largest proportions for females and males were those aged 0-4 years, 5-9 years, 10-14 years and 15-19 years, with the lowest proportions being people aged 80-84 years.

Mortality and burden of disease

The 'Mortality inequalities in Australia 2009–2011' (AIHW, 2014) provided quality death information of Asia-born Australians including overall and cause-specific age standardised mortality by sex, using ICD-10 coded death data. However, the standard population was based on an Australia standard (as at 30 June 2001), which made the cross-country benchmarking difficult. However, the standardised rate ratio of Asia-born Australians to Australian-born helps to understand the situation of Australians born in Asian countries.

Australia is in the process of producing their third Australian Burden of Disease Study (ABDS), which is for the reference year 2011. There were some efforts made to understand fatal burden of disease in Aboriginal and Torres Strait Islander peoples. However, no ethnic or place of birth data of disease burden is available so far except for mortality (AIHW, 2015).

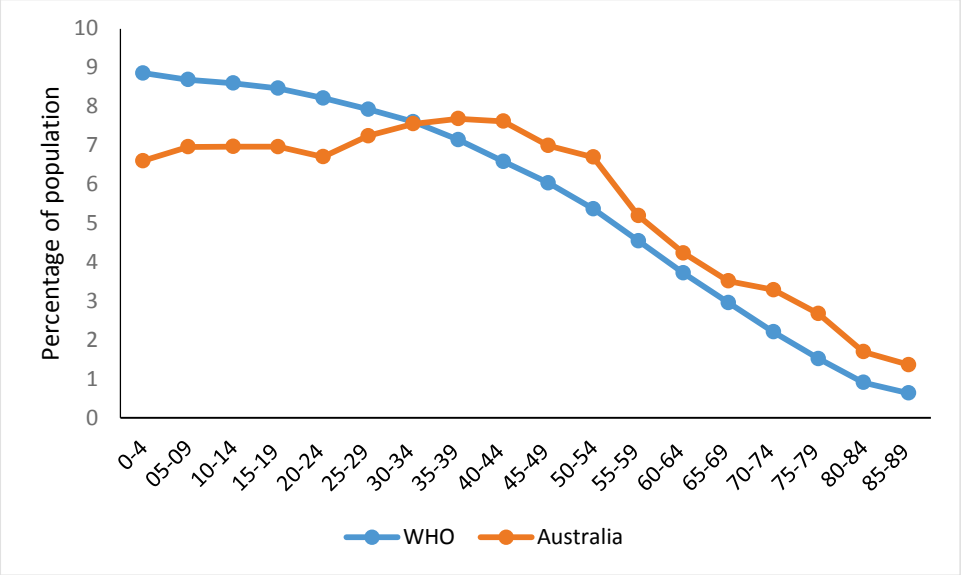


Figure 138 Comparison of Australia and WHO's World population standards

As in **Table 122**, the age standardised mortality ratios were both 0.64 for female and male Asia-born Australians relative to those born in Australia (AIHW, 2014). If we apply these ratios to the mortality rates in 2010 by IGME and compare the adjusted rates with the rates of Asian in Waitemata and Auckland DHBs (2010-12), the Asian in Waitemata seemed to have a lower mortality rate than the Asia-born Australians for both female and male respectively; the Asians in Auckland DHB were roughly comparable to the Australians born in Asia (***Figure 139***). Caution needs to be exercised when explaining the graph as the data were from different years and residual confounding and biases may still exist.

For most causes of death, Australians born in Asian had lower mortality rates than the people born in Australia (**Table 122**). However, the exceptions were stomach and liver cancers for both females and males. Female Australians born in Asia also had slightly increased death rates associated with diabetes. In addition, Asian-born immigrants had lower rates of overweight and obesity and medium or high risk for alcohol drinking, but higher rates of inactivity (M, 2002).

Table 122 Standardised rate ratio for people born in Asia relative to people born in Australia, by sex, 2009-2011

Sex	Cause of death	Rate ratio
Male	All causes	0.64
	Coronary heart diseases (I20–I25)	0.63
	Cerebrovascular diseases (I60–I69)	0.81
	Land transport accidents (V01–V89)	0.51
	Suicide (X60–X84)	0.38
	Diabetes (E10–E14)	0.97
	Dementia and Alzheimer's disease (F00–F03, G30)	0.60
	Stomach cancer (C16)	1.28
	Colorectal cancer (C18–C21)	0.57
	Liver cancer (C22)	2.05
	Pancreatic cancer (C25)	0.94
	Lung cancer (C33, C34)	0.78
	Prostate cancer (C61)	0.47
	Lymphomas (C81–C85, C96)	0.66
	Leukaemia (C91–C95)	0.72
Female	All causes	0.64
	Coronary heart diseases (I20–I25)	0.57
	Cerebrovascular diseases (I60–I69)	0.71
	Suicide (X60–X84)	0.73
	Diabetes (E10–E14)	1.12
	Stomach cancer (C16)	1.50
	Colorectal cancer (C18–C21)	0.61
	Liver cancer (C22)	1.80
	Pancreatic cancer (C25)	0.80
	Lung cancer (C33, C34)	0.69
	Breast cancer (C50)	0.66
	Uterine cancer (C53–C55)	0.88
	Ovarian cancer (C56)	0.83

Data source: http://www.aihw.gov.au/publication-detail/?id=60129548021&tab=3, accessed 1 April 2016

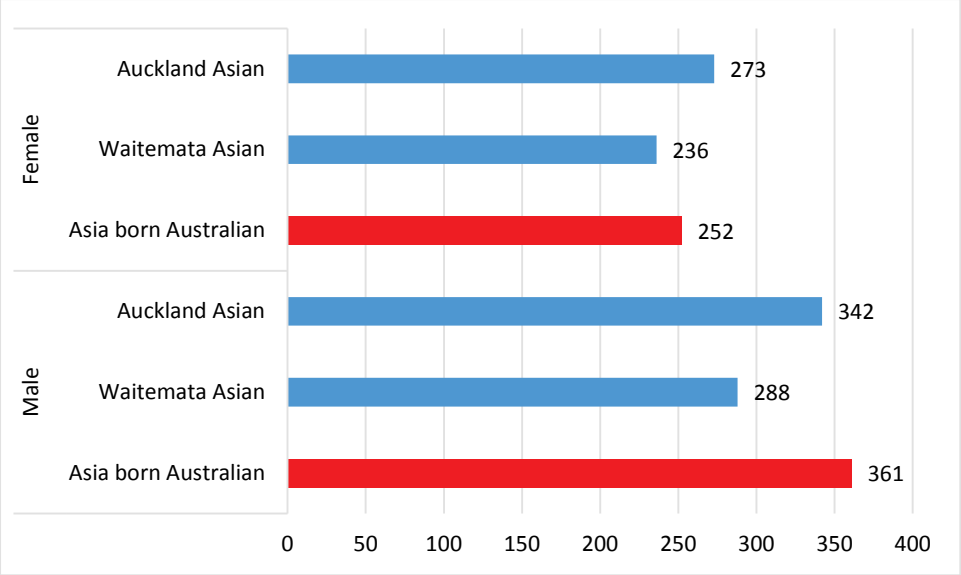


Figure 139 Adjusted mortality rate of Asians in New Zealand and Australians born in Asian countries

Maternal health and use of health services

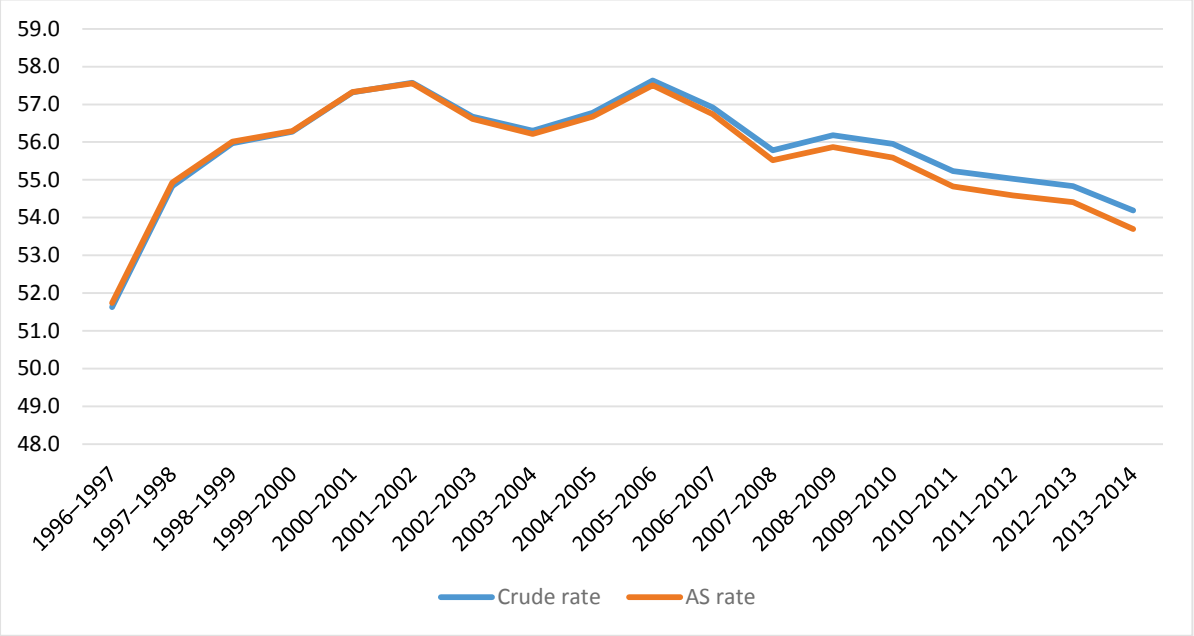
The 'Maternal deaths in Australia 2008–2012' (Humphrey MD, 2015) reported the MMR was 6.0 maternal deaths per 100,000 women for births for women born in Australia and it was 6.3 for women born in other countries. There was no data for women born in Asia. The numbers reported in this report were higher than the figures in GBD 2013 (4.8 per 100,000 live births), acknowledging the difference in estimation methods (women giving birth versus live births as the denominator) and years for comparisons (2008-12 vs 2013).

The infant low birth weight rate was 6.2% for mothers born in Australia whereas it was 5.9% for mothers born overseas in 2008. No more specific data was available for infants whose mothers were born in Asia. The national 6.2% low birth weight rate reported by World Bank in 2010 was aligned with these numbers (The World Bank, 2016).

The participation rates in the National Cervical Screening Program of Australia for 2012–2014 (AIHW, 2016) were 70.2% (crude rate) and 70.7% (age standardised rate using Australian standard population at 30 June 2001), which are higher than the rate in 2010 (57.4%) (ICSN, 2016). However, no data was available for women born in Asia.

In 2011–2012, the difference in the age standardised breast screening participation rate between English-speaking women (55.3%) and those who reported that they speak a language other than English at home (49.9%) was 5.4% (AIHW, 2014). Language spoken is clearly not the same as ethnicity or country of birth, but it may suggest new immigrant women born in Asian countries have a slightly lower breast screening rate. Nevertheless, these rates are clearly lower than the rates for Asian women in both Auckland and Waitemata DHB (76% for Auckland Asian and 66% for Waitemata Asian as at December 2014). Nationally in Australia, there seemed to be a slow downward trend since 2008-09 (***Figure 140***).

At December 2012, 92% of children were assessed as fully vaccinated at each of the three childhood milestones (12, 24 and 60 months) in Australia. Coverage rates at 12 and 24 months have been steady at around 90% since 2003, according to the report of "Australia's health 2014' (AIHW, 2014).



Notes:

1 Data for 2012–2013 and 2013–2014 are preliminary and subject to change.
2 Crude rates are the number of women screened as a proportion of the female population.
3 Age-standardised (AS) rates are the number of women screened as a proportion of the female population and age-standardised to the Australian population at 30 June 2001.
4 Number of women screened includes all women screened in each jurisdiction, not just those women resident in each jurisdiction.
5 Periods cover 1 January 1996 to 31 December 1997, 1 January 1997 to 31 December 1998, 1 January 1998 to 31 December 1999, 1 January 1999 to 31 December 2000, 1 January 2000 to 31 December 2001, 1 January 2001 to 31 December 2002, and 1 January 2002 to 31 December 2003, 1 January 2003 to 31 December 2004, 1 January 2004 to 31 December 2005, 1 January 2005 to 31 December 2006, 1 January 2006 to 31 December 2007, 1 January 2007 to 31 December 2008, 1 January 2008 to 31 December 2009, 1 January 2009 to 31 December 2010, 1 January 2010 to 31 December 2011, 1 January 2011 to 31 December 2012, 1 January 2012 to 31 December 2013, and 1 January 2013 to 31 December 2014.

Source: AIHW analysis of BreastScreen Australia data, accessed 1 April 2016

Figure 140 Participation in BreastScreen Australia, 1996–1997 to 2013–2014

Asian of Canada

In Canada, 'visible minorities' are used in accordance with the Employment Equity Act of Canada. The Act defines 'visible minorities' as 'persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour' (Statistics Canada, 2016), with the aim of promoting equal opportunity in employment.

Asian population in Canada

When the concept of visible minority was applied, South Asian and Chinese made up 4.8% and 4.0% respectively of the total population in 2011, with Korean accounting for 0.5%. When single and multiple responses of self-identified ethnic origin were both counted in Census 2011 of Canada, Chinese constituted 4.5% with a population of 1,487,580; and 3.6% for East Indian (1,165,145).

Table 123 Visible and non-visible minority populations by group, 1996–2011, Canada

Group	1996[2,3]		2001[4]		2006[5]		2011[1]	
	Population	%	Population	%	Population	%	Population	%
South Asian	670,590	2.4%	917,075	3.1%	1,262,865	4.0%	1,567,400	4.8%
Chinese	860,150	3.0%	1,029,395	3.5%	1,216,565	3.9%	1,324,750	4.0%
Filipino	234,195	0.8%	308,575	1.0%	410,695	1.3%	619,310	1.9%
Southeast Asian	172,765	0.6%	198,880	0.7%	239,935	0.8%	312,075	0.9%
West Asian			109,285	0.4%	156,700	0.5%	206,840	0.6%
Korean	64,835	0.2%	100,660	0.3%	141,890	0.5%	161,130	0.5%
Japanese	68,135	0.2%	73,315	0.2%	81,300	0.3%	87,270	0.3%
Visible minority, n.i.e.	69,745	0.2%	98,915	0.3%	71,420	0.2%	106,475	0.3%
Multiple visible minorities	61,575	0.2%	73,875	0.2%	133,120	0.4%	171,935	0.5%
Not a visible minority	25,330,645	88.8%	25,655,185	86.6%	26,172,935	83.8%	26,587,575	80.9%
Total population in private households	28,528,125	100.0%	29,639,030	100.0%	31,241,030	100.0%	32,852,320	100.0%

Data source: https://en.wikipedia.org/wiki/Demographics_of_Canada, accessed 2 April 2016

Note:
1. Statistics Canada, NHS Profile, Canada, 2011
2. Statistics Canada, Population by Aboriginal Groups and Sex, Showing Age Groups, for Canada, 1996 Census (20% Sample Data)
3. Statistics Canada, Total Population by Visible Minority Population, for Canada, 1996 Census (20% Sample Data)
4. Statistics Canada, Community Highlights for Canada
5. Statistics Canada, 2006 Community Profiles: Canada (Country)

Figure 141 shows that the three Asian sub-groups, South Asian, Chinese and Korean, were generally younger than the total population of Canada in Census 2006. South Asian had a higher proportion of children less than 14 years (24.2% vs. 17.9% of the total population), with Korean having a relatively large proportion of its population aged 15-24 years (20.4% vs. 13.5% of the total population). 10.7% of Chinese were aged more than 65 years, close to 13.0% of the total Canadian population and only 6-7% for South Asian and Korean in 2006.

Also in Census 2006, the valuable generation status information was available. Among people aged more than 15 years, Korean had the highest proportion of being the first generation (91.3% vs. 84.6% for Chinese and 85.6% for South Asian). This has implications for acculturation, health seeking behaviour, use of health and social services and health status.

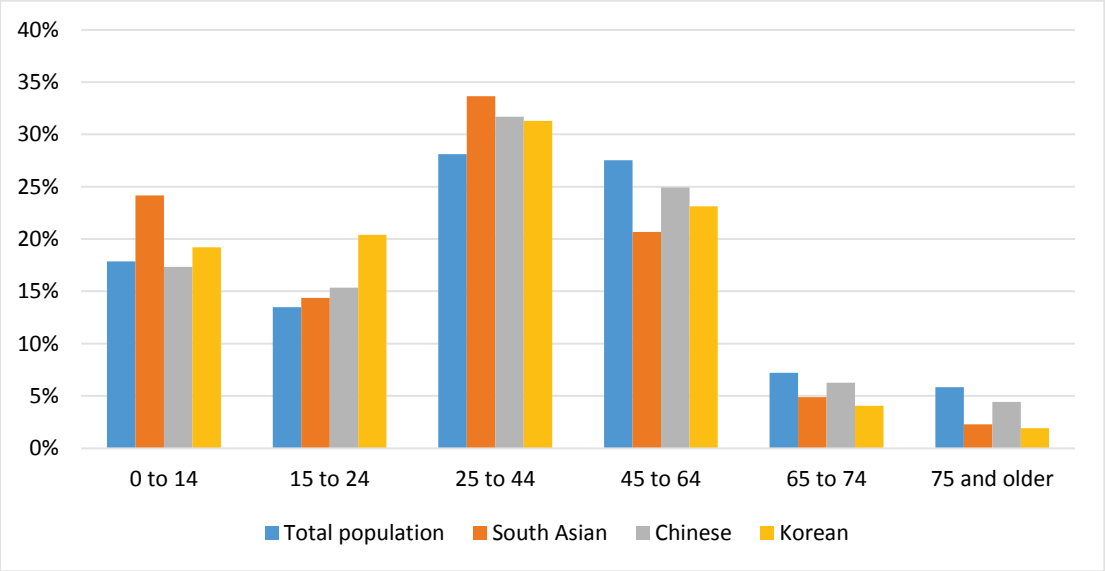


Figure 141 Age distribution by ethnicity (visible minority group), Census 2006, Canada

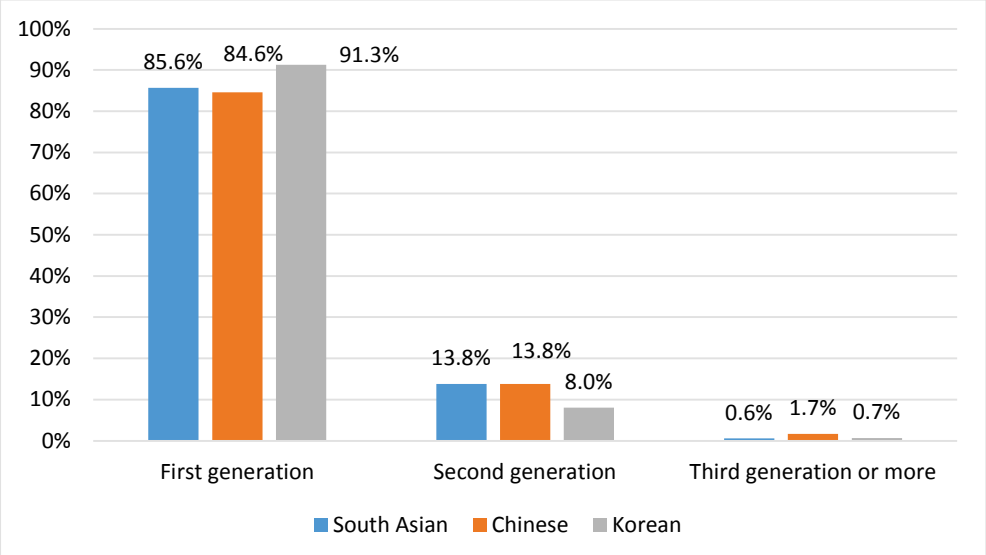


Figure 142 Distribution of generation status by ethnicity (visible minority group), 15+ years, Census 2006, Canada

Mortality and burden of disease

There is a lack of information on race/ethnicity in Canadian vital statistics data (e.g. birth/death records), which limits our ability to investigate the birth or death data of Asians living in Canada or understand the relationship between ethnicity and mortality (Hyman, 2013).

To overcome the data gap at least partially, a census mortality follow-up study was undertaken between 1991 and 2001 in Canada (Wilkins, 2008). It was a nationally representative Canadian cohort study, based on a 15% sample of the adult population of Canada, who completed the 1991 census long-form questionnaire (about 2.7 million, including 260,000 deaths). East Asian had a 34%-37% lower mortality rate than the non-visible minority population in Canada over the 10 years and it was 20%-42% lower for South Asian. The standardised mortality rate (SRR) ratios for Asian in Canada were generally comparable to the mortality rate ratios for Asians of Waitemata and Auckland DHBs (all ages), though they were slightly higher than those of the two DHBs (reference: SRR=0.53 for women and 0.47 for men in Waitemata DHB; 0.61 for women and 0.56 for men in Auckland DHB).

The census mortality follow-up study had some limitations, e.g. it was restricted to the adult population aged 25+ years and the follow-up period was just 10 years, so that the total mortality rate of all ages and at a given year were still unknown. However, it is probably still the best evidence available so far for the 'visible minority' population in terms of the mortality rate in Canada.

No burden of disease analysis is available for the visible minority populations in Canada.

Table 124 Standardised mortality rata ratio by sex for South and East Asians, according to age in 1991, 25+ years, Canada

Visible minority group	Sex	SRR*	95%CI
South Asian	Male	0.58	0.53, 0.62
	Female	0.80	0.72, 0.90
East Asian	Male	0.63	0.60, 0.66
	Female	0.66	0.63, 0.70

* Standardised rate ratio

Risk factors

Due to a lack of vital registrations by ethnicity, the indicators for maternal and infant health are not available in Canada.

In general, the Canadian Community Health Survey, a cross-sectional national health survey, is a useful tool, as it contains an extensive set of variables pertaining to health status, healthcare utilisation, lifestyle and social conditions (refer to Appendix 6 for some of the definitions used in the Canadian Community Health Survey). Data are available since 2001, with biannual samples for 2001, 2003 and 2005 and annually since 2007. The Visible minority population is part of the sample of the survey.

A study was undertaken in Canada using the three cross-sectional cycles (for 2000, 2003 and 2005) of the Canadian Community Health Survey of people aged 12 years and older. The surveys employed self-reported questionnaires (Richard Liu, 2010). After adjustment for socio-demographic characteristics, people from most visible minorities including Chinese, Korean and South Asian, were less likely to smoke, were more likely to be physically inactive with the exception of people of Korean ethnicity, and were less likely to be obese, compared to the white population in Canada. In addition, Korean or Japanese were more likely to smoke than Chinese or South Asian, and South Asian were more likely to be obese than Chinese. Chinese and Korean had comparable likelihood to have a diagnosis of hypertension, but South Asian tended to be more likely, in comparison to the White in Canada. For definitions of the risk factors, refer to the appendix.

Table 125 Adjusted odds ratios for cardiovascular risk factors, aged 12 years and older, the Canadian Community Health Survey*

Ethnic group	Hypertension (95%CI)	Daily or occasional smoker (95%CI)	Physical inactivity (95%CI)	BMI≥30 (95%CI)
White	1.00	1.00	1.00	1.00
Chinese	1.04 (0.83–1.29)	0.35 (0.28–0.43)	1.58 (1.41–1.78)	0.28 (0.22–0.35)
Japanese or Korean	1.09 (0.75–1.58)	0.67 (0.49–0.92)	0.95 (0.75–1.22)	0.41 (0.26–0.66)
South Asian	1.18 (0.99–1.42)	0.36 (0.29–0.44)	1.66 (1.48–1.85)	0.63 (0.51–0.78)

* Adjusted for age, sex, marital status, education, household income, language spoken, immigration status, residency type (urban or rural), household size, region (province or territory) and chronic diseases (heart disease, stroke, cancer, bronchitis, chronic obstructive pulmonary disease, bowel disease, arthritis, epilepsy, ulcers, thyroid disease and diabetes mellitus). Diabetes mellitus was not included in the model for diabetes as a risk factor.

Use of health services

Immunisation coverage rate data for Asian infants does not seem to exist in Canada. There is no recent data on Asian sub-groups of the visible minority population regarding screening service use. However, the Canadian Community Health Survey in 2001 still provided some useful insights. Cancer screening tests during the 12 months before the survey were compared between the visible minority population and the White. The visible minority population in general were 32% less likely to have a mammogram and 53% less likely to have a Pap smear, compared to the White (Hude Quan, 2006). There was no further breakdown of the visible minority population in this study. Asian women in both Waitemata and Auckland DHBs appear to do better than the visible minority women in Canada, although the data for comparison came from different years (Canada, 2001 and New Zealand, 2014-2015).

Table 126 Use of health services by visible minority, the Canadian Community Health Survey, 2001

Health service (sex and age, year)	Odds ratio (95%CI)	
	Unadjusted	**Adjusted***
Mammogram (women >=35)	0.61 (0.57, 0.65)	0.68 (0.59, 0.80)
Pap smear (women>=18)	0.31 (0.29, 0.33)	0.47 (0.39, 0.56)

Note: *Adjusted for sex, age (< 65 yr or >= 65 yr), marital status (married or common law; single: others, including widowed, separated and divorced), highest level of education (less than secondary, secondary, postsecondary), annual income (< $30 000, $30 000–$49 999, $50 000–$79 999, >= $80 000, datum missing), immigrant status and length of stay in Canada (born in Canada, < 10 yr or >=10 yr since immigration), speaking English or French (yes or no), self-perceived health (excellent, very good, good, fair, poor) and number of chronic diseases (0, 1, 2 or >=3). Immigrant status and length of residence in Canada are proxies of acculturation. After categorizing the study population based on immigration status (born in Canada: yes or no), we then grouped those not born in Canada into 2 subgroups (< 10 yr or >=10 yr since immigration); 1 variable therefore has 3 categories (born in Canada and < 10 yr or >= 10 yr since immigration). In our actual modelling, we specified this 3-level variable by entering 2 yes-or-no dummy variables (immigration < 10 yr ago and >= 10 yr ago) into our model; being born in Canada (or not) was the baseline variable.
Source: (Hude Quan, 2006)

Asian of the UK

Ethnicity data are not currently collected at birth registration in England and Wales (Ron Gray, 2009), and ethnicity is not recorded on the death certificate either (Bhopal R, 1999). It has limited our ability to present ethnic specific data for Asians in the UK.

Asian population in the UK

There were 4.2 million Asian/Asian British residing in England and Wales in the UK, based on Census 2011 (refer to Appendix 7 for the question of ethnic group), accounting for approximately 7.5% of the total population. In addition, there were 341,000 classified as 'White and Asian' in the mixed/multiple ethnic group (0.6% of the total).

Within Asian/Asian British, Indian accounted for 33.5%, followed by Pakistani (27%), then Bangladeshi (11%) and Chinese (9%) (***Figure 144***).

Table 127 Usual resident population of England and Wales, the UK, Census 2011

Ethnic group	Population	Proportion, %
White	48,209,395	86.0%
Mixed/multiple ethnic group	1,224,400	2.2%
Asian/Asian British	4,213,531	7.5%
Black/African/Caribbean/Black British	1,864,890	3.3%
Other ethnic group	563,696	1.0%

Source: ONS Crown Copyright Reserved [from Nomis on 4 April 2016]

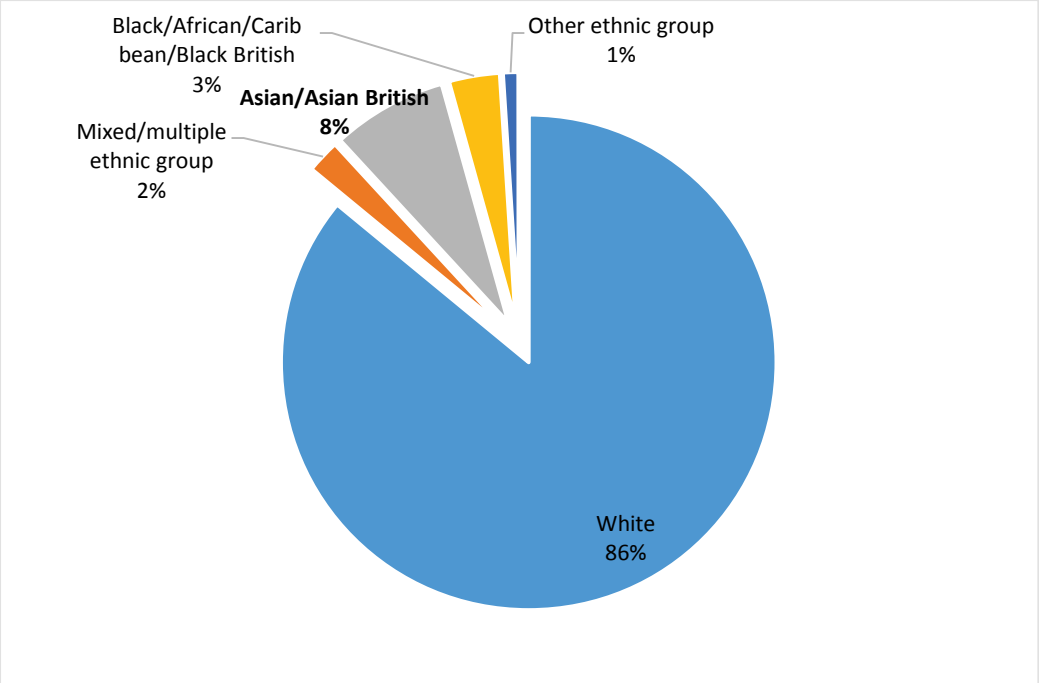


Figure 143 Usual resident population of England and Wales by major ethnic group, Census 2011, the UK

Table 128 Usual resident population of Asian sub-group, England and Wales, the UK, Census 2011

Asian sub-group	Sex					
	Both (proportion, %)		Female (proportion, %)		Male (proportion, %)	
Bangladeshi	447,201	10.6%	216,330	10.3%	230,871	10.9%
Chinese	393,141	9.3%	207,113	9.9%	186,028	8.8%
Indian	1,412,958	33.5%	693,038	33.1%	719,920	34.0%
Other Asian	835,720	19.8%	428,597	20.5%	407,123	19.2%
Pakistani	1,124,511	26.7%	548,296	26.2%	576,215	27.2%
Total	4,213,531	100.0%	2,093,374	100.0%	2,120,157	100.0%

Source: ONS (Office for National Statistics) Crown Copyright Reserved [from Nomis on 4 April 2016]

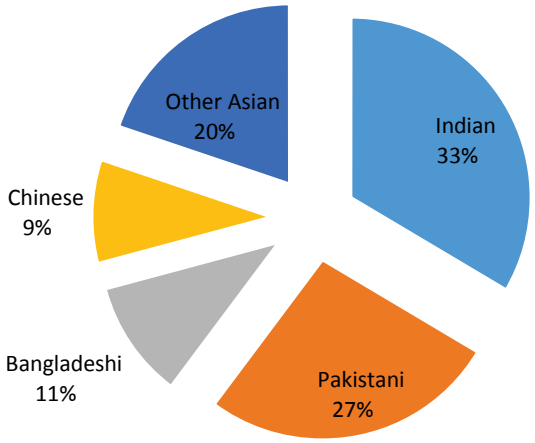


Figure 144 Asian make-up of usual resident population of England and Wales, Census 2011, the UK

Asian British, in general, had a higher proportion of children (23.2% vs. 17.6% for total population) in Census 2011, which is particularly true for Bangladeshi and Pakistani but not for Chinese. Chinese had the highest proportion of population within working age (15-64 years) at 83.2% in comparison to 65.9% of the total population and 65.6% of the White total. The Asian British were generally younger than the total population of England and Wales; Indian had the highest proportion of 65+ years of all the Asian sub-groups (8.1%), which was less than half of the proportion for the total population (16.4%) (***Figure 145***).

By birth place, more than half of Pakistani and Bangladeshi were born in the UK, much higher than Chinese and Other Asian (Indian, more than 40% born in the UK).

Figure 147 shows the ethnicity of the non-UK born population, by country of birth, for the top 10 countries in the Middle East and Asia. Except Iraq and Iran, predominantly Asian British were born in these countries. There was also a good proportion of White British born in Hong Kong (SAR of China) and Malaysia, which has implications for using birth place as proxy of ethnicity.

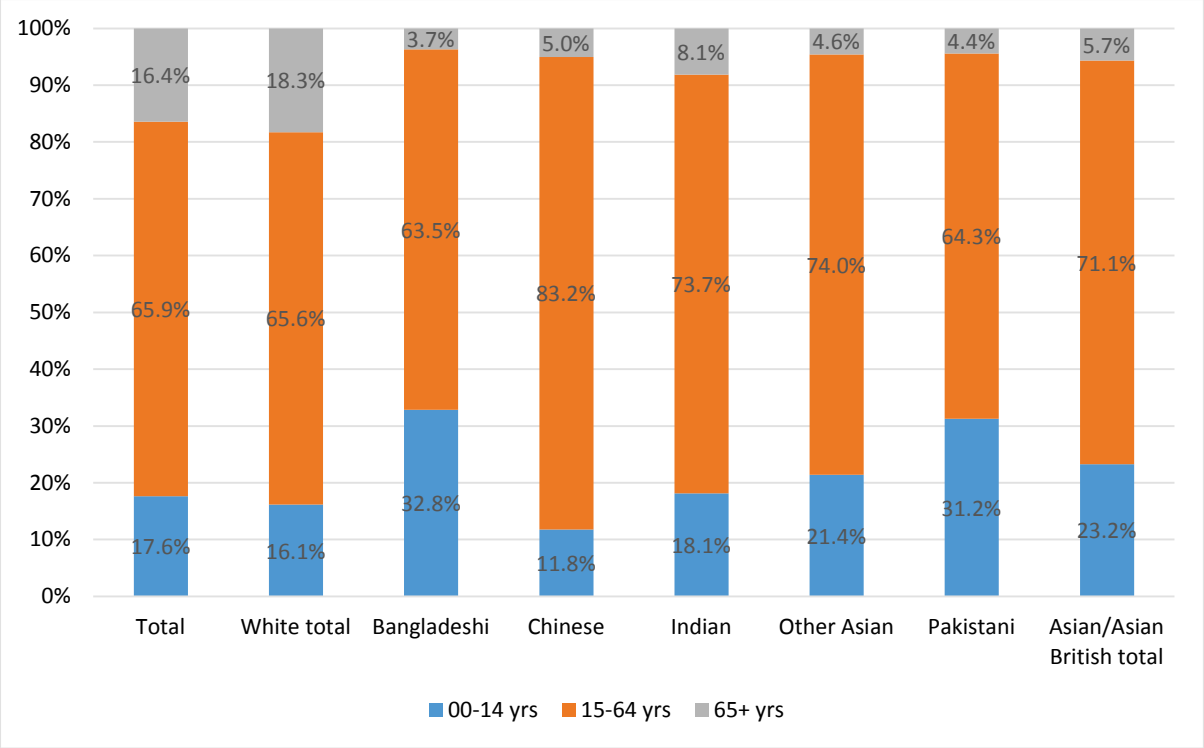


Figure 145 Ethnic population by broader age group, both sexes, England and Wales, Census 2011, the UK

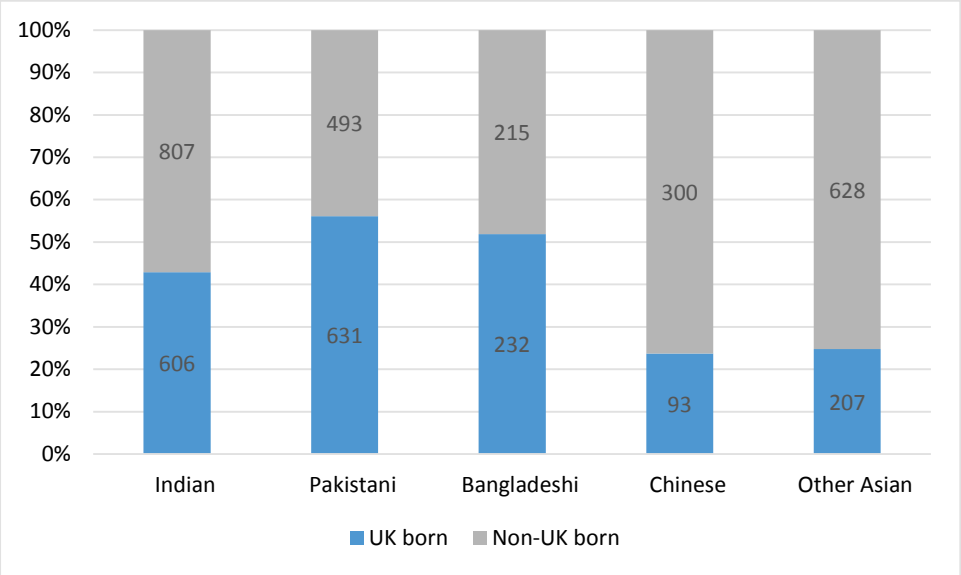
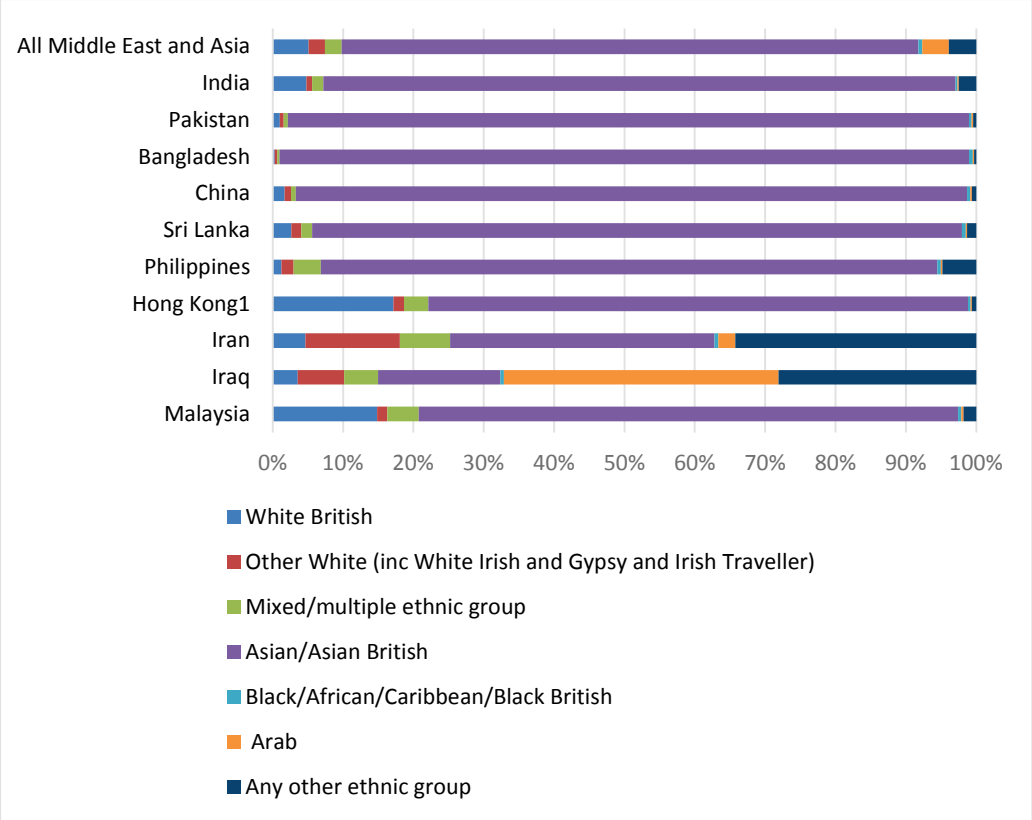


Figure 146 Population of Asian sub-group by birth place (thousands), England and Wales, Census 2011, the UK



1. Special administrative region of China
Source: Census 2011, Office for National Statistics

Figure 147 Ethnicity of the non-UK born population (proportions, %), by country of birth, for top 10 countries in Middle East and Asia, England and Wales, 2011

General health

Life expectancy of Asian in the UK

Since ethnicity is not recorded on death certificates in the UK (Bhopal R. S., 2012), researchers have to use alternative methods to estimate mortality by ethnicity, life expectancy and disability free life expectancy. Two methods were used estimating life expectancy (and disability-free life expectancy) of ethnic populations, the Standardised Illness Ratio (SIR) method and the Geographically Weighted Method (GWM) (Pia Wohland, 2015). Only the GWM estimates are reported here for simplicity.

In 2001, Indian and Chinese females had higher life expectancy at birth, compared to the White Total or the total female population in the UK, and Indian and Chinese men had comparable figures to the White men. Bangladeshi and Pakistani had slightly lower life expectancy at birth for both women and men (***Figure 148***). Of note, when the SIR method was used, there were moderate increases in life expectancy at birth for Chinese females (79.4 years) and males (84.3 years), which was not seen in other ethnic groups.

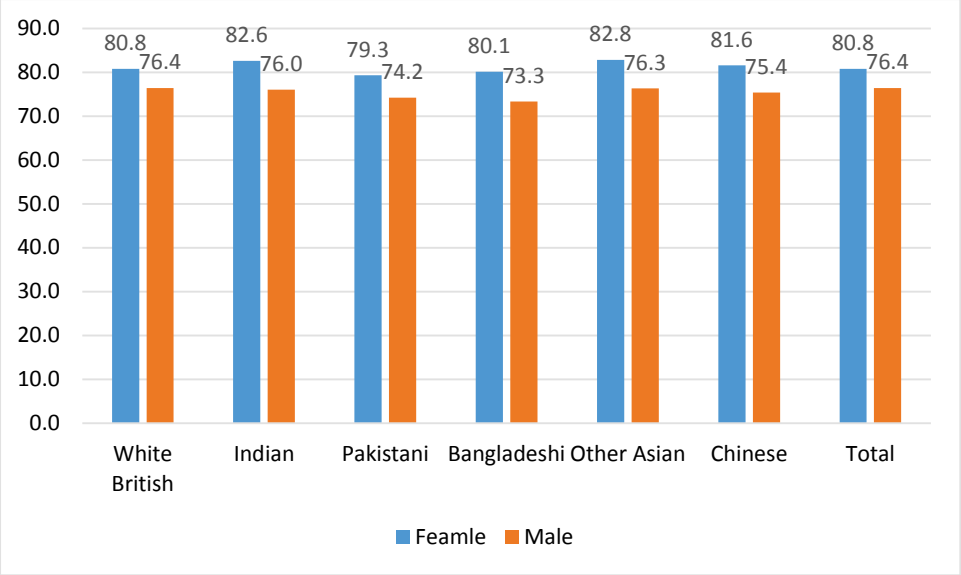
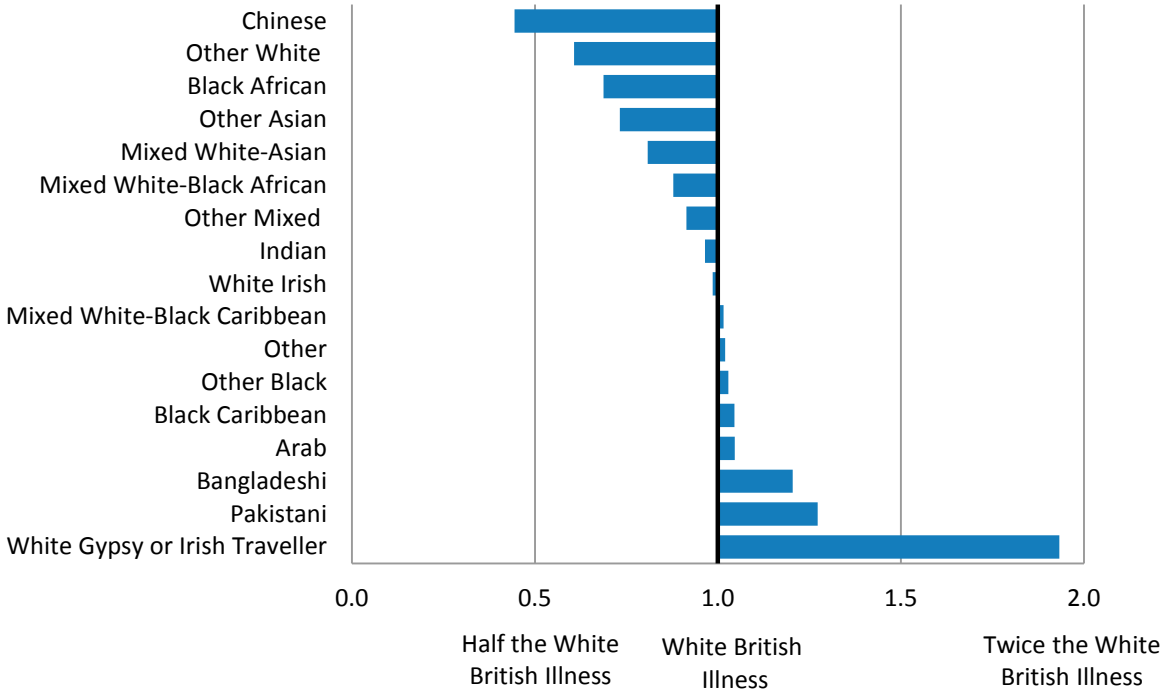


Figure 148 Life expectancy at birth of Asian sub-groups, England and Wales, 2001

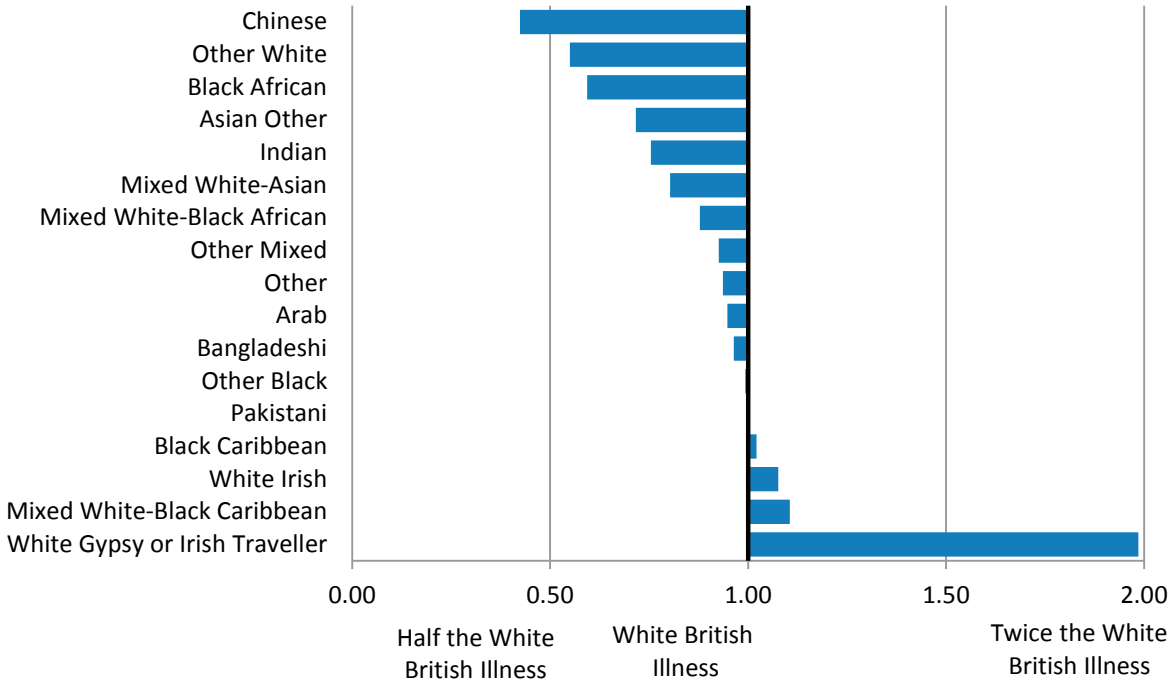
Long-term illness

One of the two health measures in the 2011 Census was limiting long-term illness, measured through asking 'Are your day to-day activities limited because of a health problem or disability which has lasted, or is expected to last, at least 12 months? Include problems related to old age' with responses 'Yes, limited a lot,' 'Yes, limited a little,' and 'No.' Chinese reported better health in 2011 (and in censuses 1991 and 2001, data not shown), half or under half of the White illness rates for both men and women (Bécares, 2013). Indian females had a similar age-standardised rate of long-term illness to the White, but Indian men were 25% less likely to have long-term illness, in comparison to the White men. Pakistani and Bangladeshi women had higher rates of long-term illness than the White.



Sources: the 1991, 2001 and 2011 Censuses (Crown Copyright)

Figure 149 Age-standardised ratios of Limiting Long-Term Illness for ethnic minority groups, compared to the White British group, females, Census 2011



Sources: the 1991, 2001 and 2011 Censuses (Crown Copyright)

Figure 150 Age-standardised ratios of Limiting Long-Term Illness for ethnic minority groups, compared to the White British group, males, Census 2011

Mortality

The lack of ethnicity data on death registration has restricted investigation of health inequality in general and cause-specific mortality. Again, country of birth was used as a proxy for ethnicity, which introduced a degree of misclassification bias. One such example is many older people born in India and living in England and Wales are White. In addition, there is inconsistent reporting of country of birth at death registration and on Census forms which is particularly a problem for the Indian subcontinent countries (Association of Public Health Observatories, 2005).

Among people aged 20-69 years, people born in Bangladesh and Pakistan had the highest mortality rates from circulatory disease. People born in India also had higher than average circulatory disease rates, together with those born in Ireland, Scotland, West and East Africa and the Caribbean Commonwealth (***Figure 151***). For people of Indian, Bangladeshi and Pakistani origin, the higher mortality rate from circulatory disease was thought to be due partly to their variable but substantially raised prevalence of diabetes (Bhopal R, 1999). In terms of cancer mortality, people born in Asian countries such as India, Pakistan, Bangladesh and Sri Lanka all had lower than average mortality rates. For all causes mortality, people born in Bangladesh and Pakistan had more than the average rate, while people born Sri Lanka and India had lower mortality rates. There was no mortality data available for Chinese in this study or elsewhere.

Figure 151 Standardised mortality ratios by country of birth, aged 20-69, England and Wales 1999-2003

Maternal and infant health

Ethnicity data are not currently collected at birth registration in England and Wales, as with death registration (Ron Gray, 2009). Since 2005, birth registration records have been linked with National Health Service (NHS) Numbers for Babies (NN4B) records, which are further linked to death registration records for babies who died before their first birthday. By linking the 3 data sources, figures can be reported for infant mortality by gestational age and ethnicity, as well as other risk factors. The NHS birth notifications system collects information about ethnicity to help organisations monitor their service delivery. Ethnicity is usually self-defined, for birth notifications the baby's ethnic group is defined by the mother. Individuals may choose not to state their baby's ethnicity. For babies born in 2013, 3.4% of live births had ethnicity recorded as "Not Stated" (ONS, 2015).

In the 2005 birth cohort of linked data, people of Pakistani origin had the highest infant mortality rate, while the Bangladeshi and White groups had the lowest infant mortality rates (Ron Gray, 2009). In the 2013 birth cohort, Indian and All Others (including Chinese and other groups) had comparable infant mortality rates to the average in England and Wales (though slightly higher than the White British). Pakistani infants still had the highest mortality rate of all ethnic groups, rates for children of Bangladeshi origin were also higher than the White British - it is not known whether this is due to random variation over time or is valid and can be potentially explained by social or clinical factors.

The combined infant mortality rate for Asian of Waitemata and Auckland DHBs for the years 2010-12 was 2.2 per 1000 live births, which appears much better than the Asian in England and Wales in 2013.

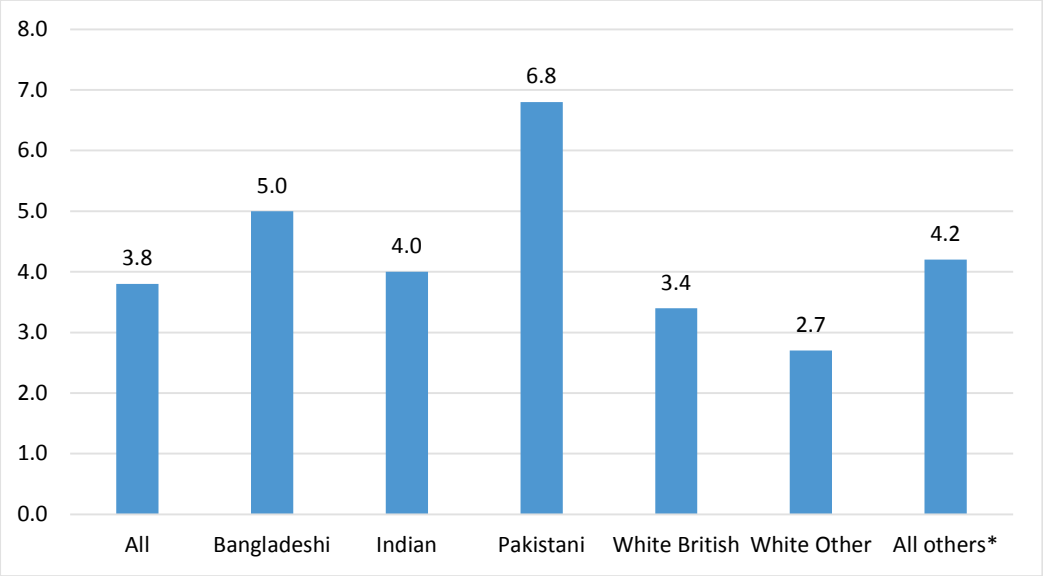


Figure 152 Infant mortality by ethnic group (per 1000 live births), England and Wales, 2013 birth cohort

Maternal death is rare in the UK as well. There are reports indicating an increased risk of death from all major causes for women born in West Africa and the Caribbean between 1970 and 1985, in England and Wales (Ibison JM, 1996; Charles Anawo Ameh, 2008). There were also studies suggesting that severe maternal morbidity is significantly more common among non-white women than among white women in the UK, particularly in black African and Caribbean ethnic groups. It is

also believed by the researchers that the differences in severe maternal morbidity may be due to the presence of pre-existing maternal medical factors or to factors related to care during pregnancy, labour, and birth. Indian has been identified as an ethnic group rates comparable to the White population (risk ratio, 1.11; 95%CI: 0.69, 1.73), but people of Pakistani and Bangladeshi origin had roughly a 50% higher risk of severe maternal morbidity (Knight M, 2009).

Indian or Chinese did not stand out in maternal death or severe maternal morbidity reports or studies, which may suggest their risk of maternal death is comparable to the UK average. However, is the evidence suggests that moderately high levels of maternal mortality and severe maternal morbidity may exist for Asian as a whole.

Risk factors

Risk factor data for minority/ethnic groups in the UK is also scarce, particularly nationally representative data, apart from the Health Survey for England (HSE) conducted in 2004. As for obesity, revised Body Mass Index (BMI) thresholds have been recommended for South Asian populations who are at risk of chronic diseases and mortality at lower levels than European populations (Gatineau M, 2011).

The Health Survey for England (HSE) 2004 contained a higher sample of individuals from ethnic groups. When BMI of 30 or higher was used to define obesity in adults, it was found that obesity prevalence was lower among men from India and Pakistan, in particular, but also Bangladeshi and Chinese communities, when compared to the general population. Among women, obesity prevalence seemed to be lower in Pakistani than the general female population, and lower for Chinese women (***Figure 153***).

The World Obesity/Policy & Prevention (formerly, the International Obesity Task Force, IOTF) thresholds were used for children 2–18 years in the UK, together with the British 1990 Growth Reference (UK90). It was also suggested that further research was needed on the relationship between body shape, fat mass, metabolic markers and ethnicity in children and adolescents, with some evidence of ethnic differences in body composition and the potential misclassification of obesity by the current BMI thresholds in South Asian and other ethnic groups (Viner RM, 2010).

Figure 154 Shows the obesity rate based on the IOTF criteria among children in Reception (aged 4–5 years) attending state-maintained primary schools in England in 2008/09 school year. In Reception, Bangladeshi boys had a very high rate of obesity, in comparison to the White British. In Year 6 (aged 10–11 years), boys of all ethnic groups had higher prevalence rates of obesity than the White British, and most markedly, the boys of Bangladeshi ethnic group (data not shown). For girls aged 4-5 years and 10-11 years, the difference in obesity rates between ethnic groups and the White British was not as apparent as for boys.

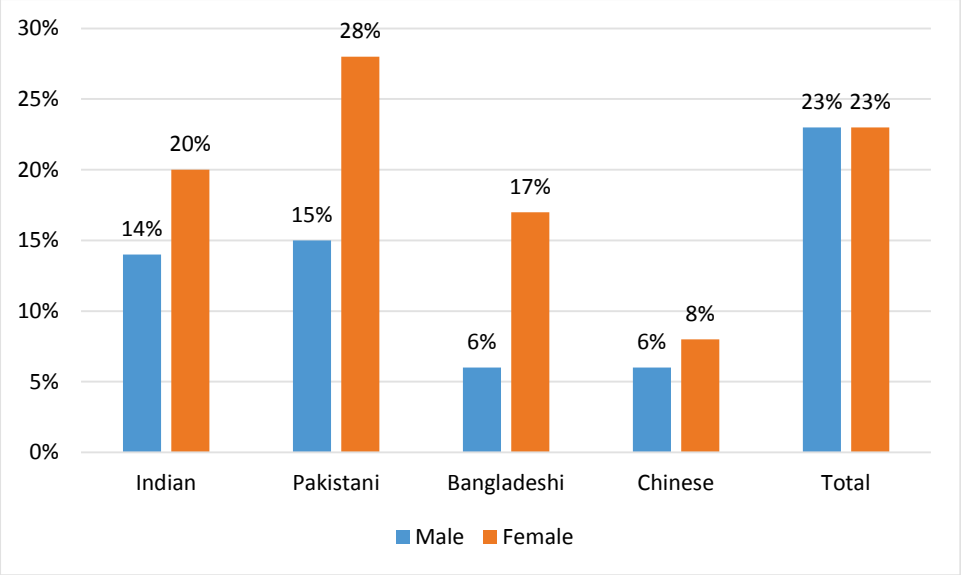


Figure 153 Prevalence of obesity of adults by ethnic group and sex, 2004, England

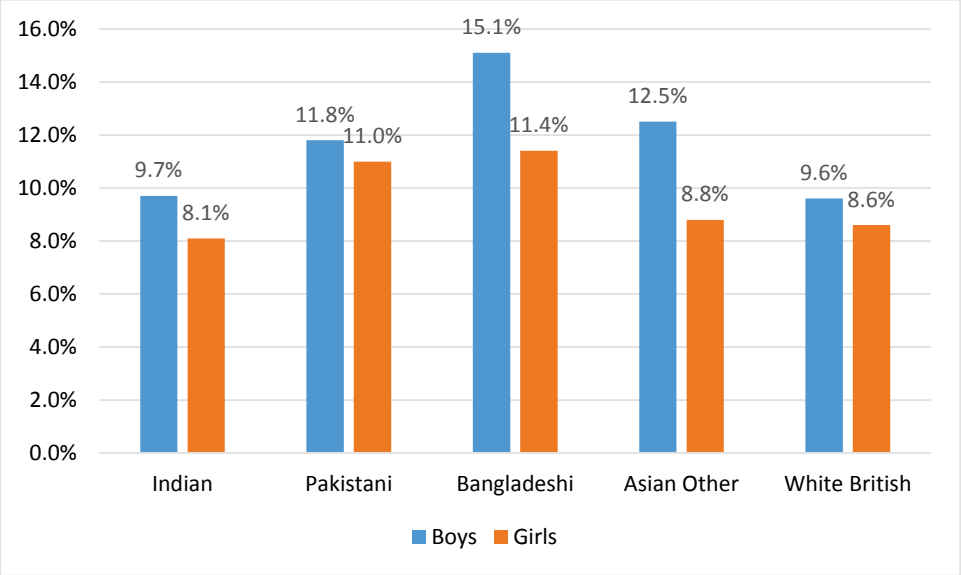


Figure 154 Prevalence of obesity of children by ethnic group and sex, in Reception, 2008/09 school year

The HSE 2004 also examined the physical activity of ethnic groups, analysing the rates for meeting the physical activity guidelines of at least five days per week of moderate intensity exercise lasting 30 minutes per day (Higgins V, 2010). For men, only Bangladeshi and Pakistani groups were found to have lower rates than the White population. In women, South Asian and Chinese groups had rates, in comparison to the White population. In a separate study, it was found that within South Asian groups, people from the Bangladeshi community had much lower levels of physical activity than other South Asian groups, while those of Indian ethnicity had the highest levels, although still lower than the White population (Hayes L, 2002).

There were no nationally representative data found on the prevalence of hypertension or smoking of Asian ethnic groups in the UK, or the data was out of date.

Opportunity

The social progress indicator framework

Opportunity is an important indicator of the social progress indicator framework.

Overall social progress index score and its dimensions

New Zealand had the highest overall social progress index score of the countries of interest in 2015. By ranking, New Zealand was ranked 5th in the world, followed by Canada 6th, Australia 10th and the UK 11th. India was ranked last, with China being second from bottom.

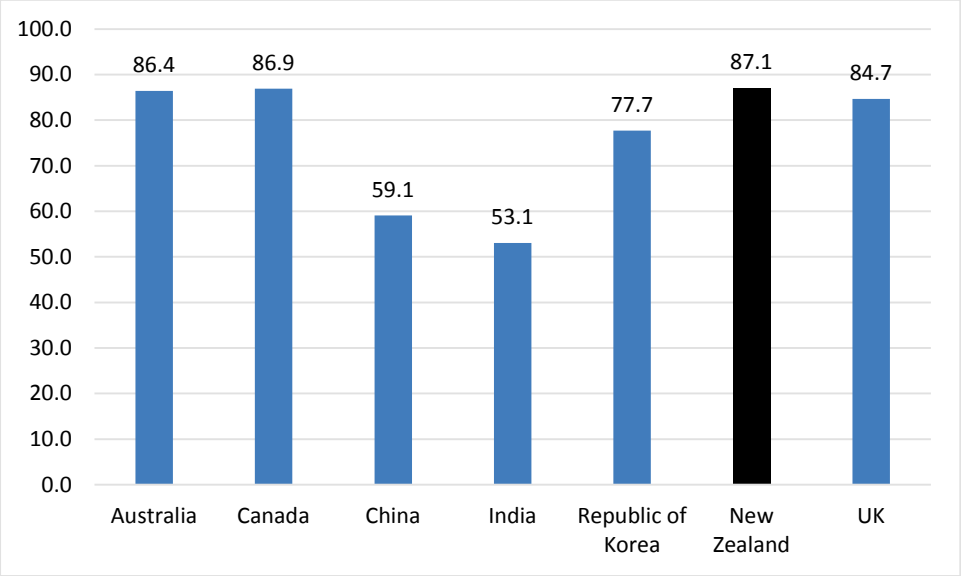


Figure 155 Overall social progress score by country, 2015

There was insufficient data for Singapore in the dimensions of basic human needs and foundations of wellbeing. New Zealand took third place (17th in the world) in basic human needs, after Canada (7th in the world) and Australia (13th in the world). New Zealand did even better in the foundations of wellbeing dimension (top of the list and 6th in the world), followed by Australia (12th in the world) and Canada (14th in the world), with India and China still the last two. New Zealand took second place in the word in the dimension of opportunity after Canada, followed by Australia (third in the world). The four Asian countries had relatively lower scores, with China being last on the list.

Table 129 Scores of basic human needs and foundations of wellbeing by country, 2015

Country	Basic Human Needs	Foundations of Wellbeing
Australia	93.7	80.0
Canada	94.9	79.2
China	73.7	65.4
India	58.9	57.4
Republic of Korea	89.1	75.6
New Zealand	92.9	82.8
UK	92.2	79.0

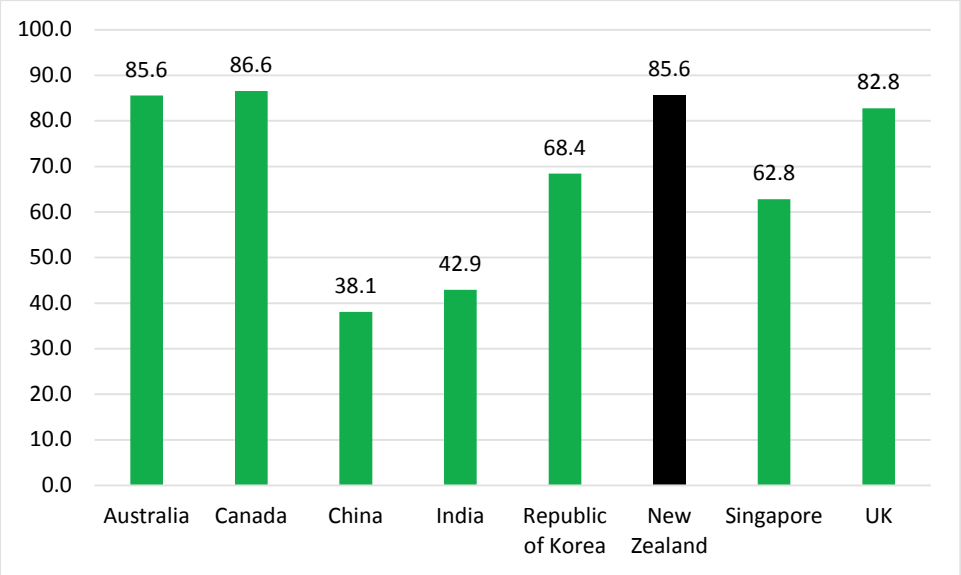


Figure 156 Score of opportunity by country, 2015

Scores of the components of opportunity

China had a very low score for personal rights (only 4.6 of 100) and India had a lower score for tolerance and inclusion. New Zealand had higher scores in the three components of opportunity, personal rights (1st in the world), personal freedom and choice and tolerance and inclusion (**Table 130**). New Zealand was behind Canada, the UK, Australia and the Republic of Korea in the access to advanced education score, but better than Singapore, China and India.

Table 130 Scores of the components of opportunity, 2015

Country	Personal Rights	Personal Freedom and Choice	Tolerance and Inclusion
Australia	97.7	88.4	78.4
Canada	87.9	88.4	84.9
China	4.6	68.5	34.9
India	55.1	56.3	28.2
Republic of Korea	67.8	72.0	60.5
New Zealand	98.8	88.8	83.0
UK	97.7	85.8	69.7
Singapore	49.5	80.2	64.9

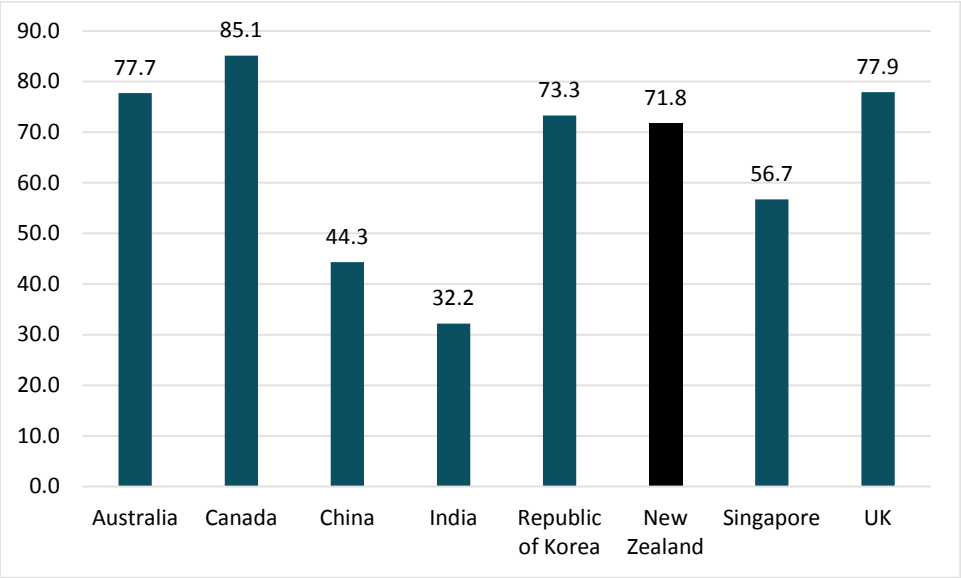


Figure 157 Score of access to advanced education by country, 2015

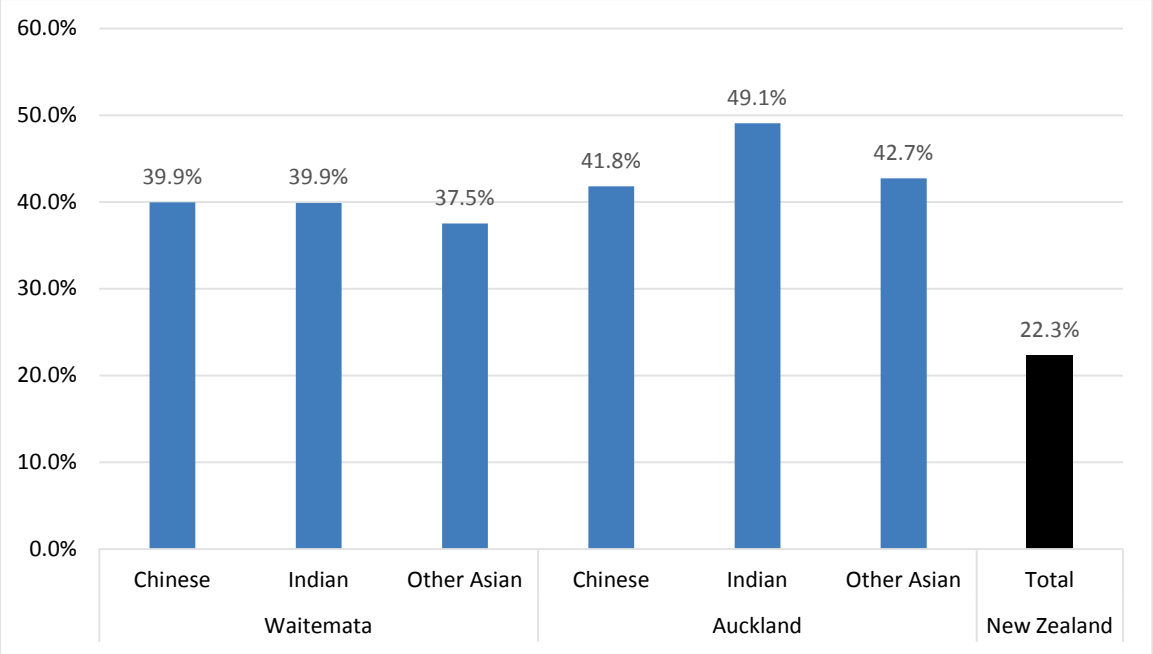
Outcome indicators of access to advanced education

Table 131 provides detailed information on the outcome indicators contributing to the component of access to advanced education (refer to Appendix 8 for the list of indicators contributing to access of advanced education). China had the lowest value of years of tertiary schooling (0.1 year, among people aged 25+ years) on the list and India had the lowest figure of women's average years in school (8.9 years, among women aged 25-34 years). There were only two globally ranked universities in Singapore in 2015, 74 for the UK.

Table 131 Raw scores of outcome indicators of access to advanced education, 2015

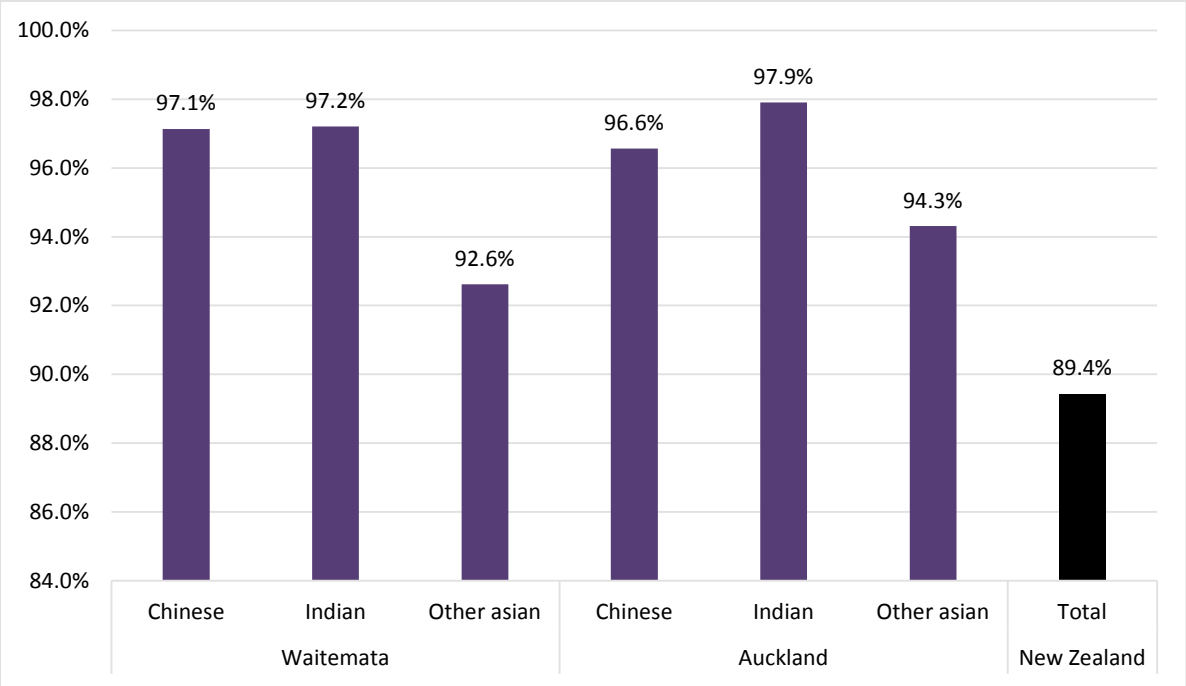
Country	Years of tertiary schooling	Women's average years in school	Inequality in the attainment of education	Number of globally ranked universities
Australia	1.3	12.5	0.018	33
Canada	1.5	15.0	0.040	26
China	0.1	8.9		46
India	0.3	5.6	0.421	14
Republic of Korea	1.5	14.6	0.281	24
New Zealand	1.1	13.6		8
Singapore	1.4	10.1		2
UK	0.9	13.6	0.026	74

Higher proportions of Asian people aged 25+ years in both DHBs had a bachelor degree/level 7 qualification or above than the New Zealand average 22.3%, particularly among Indian in Auckland DHB (49.1%) (***Figure 158***). In addition, Asian women aged 25-34 years in Waitemata and Auckland DHBs had a higher proportion with a qualification (primary, secondary and tertiary) than the New Zealand average 89.4%. This is more so for Indian and Chinese in both DHBs (***Figure 159***). While these two indicators are not comparable to the ones used in the Social Progress Index, namely years of tertiary schooling and women's average years in school including primary, secondary and tertiary, they signify a better rank than the New Zealand average in the world ranking for the access to advanced education component, and for overall opportunity as well.



Source: Census 2013, licensed to Waitemata DHB

Figure 158 Proportion of residents with a bachelor/level 7 qualifications or above, aged 25+ years, New Zealand, Census 2013



Source: Census 2013, licensed to Waitemata DHB

Figure 159 Proportion of women with a qualification, aged 25-34 years, New Zealand, Census 2013

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Appendices

Appendix 1 GHE cause categories and ICD-10 codes

Code	GHE cause name	ICD-10 code
1	**I. Communicable, maternal, perinatal and nutritional conditions**[a]	A00-B99, G00-G04, N70-N73, J00-J22, H65-H68, O00-O99, P00-P96, E00-E02, E40-E46, E50-E64, D50-D53, D64.9, U04
2	**A. Infectious and parasitic diseases**	A00-B99, G00, G03-G04, N70-N73
3	1. Tuberculosis	A15-A19, B90
4	2. Sexually transmitted diseases (STDs) excluding HIV	A50-A64, N70-N73
5	a. Syphilis	A50-A53
6	b. Chlamydia	A55-A56
7	c. Gonorrhoea	A54
8	d. Trichomoniasis	A59
9	e. Other STDs	A57-A58, A60-A64, N70-N73
10	3. HIV/AIDS	B20-B24
11	4. Diarrhoeal diseases[b]	A00, A01, A03, A04, A06-A09
12	5. Childhood-cluster diseases	A33-A37, B05
13	a. Whooping cough	A37
14	b. Diphtheria	A36
15	c. Measles	B05
16	d. Tetanus	A33-A35
17	6. Meningitis	A39, G00, G03
18	7. Encephalitis[b]	A83-A86, B94.1, G04
19	8. Hepatitis B	B16-B19 (minus B17.1, B18.2)
20	9. Hepatitis C	B17.1, B18.2
21	10. Parasitic and vector diseases	A30, A71, A82, A90-A91, B50-B57, B65, B73, B74.0-B74.2
22	a. Malaria	B50-B54, P37.3, P37.4
23	b. Trypanosomiasis	B56
24	c. Chagas disease	B57
25	d. Schistosomiasis	B65
26	e. Leishmaniasis	B55
27	f. Lymphatic filariasis	B74.0-B74.2
28	g. Onchocerciasis	B73
29	h. Leprosy	A30
30	i. Dengue	A90-A91
31	j. Trachoma	A71
32	k. Rabies	A82
33	11. Intestinal nematode infections	B76-B77, B79
34	a. Ascariasis	B77
35	b. Trichuriasis	B79
36	c. Hookworm disease	B76
37	12. Other infectious diseases	A02, A05, A20-A28, A31, A32, A38, A40-A49, A65-A70, A74-A79, A80-A81, A87-A89, A92-A99, B00-B04, B06-B15, B25-B49, B58-B60, B64, B66-B72, B74.3-B74.9, B75,B78, B80-B89, B91-B99 (minus B94.1)
38	**B. Respiratory infections**[b]	J00-J22, H65-H68,P23, U04

Code	GHE cause name	ICD-10 code
39	1. Lower respiratory infections	J09-J22, P23, U04
40	2. Upper respiratory infections	J00-J06
41	3. Otitis media	H65-H68
42	**C. Maternal conditions**	O00-O99
43	1. Maternal haemorrhage	O44-O46, O67, O72
44	2. Maternal sepsis	O85-O86
45	3. Hypertensive disorders of pregnancy	O10-O16
46	4. Obstructed labour	O64-O66
47	5. Abortion	O00-O07
48	6. Other maternal conditions	O20-O43, O47-O63, O68-O71, O73-O75, O87-O99
49	**D. Neonatal conditions**	P00-P96 excl P37.3, P37.4
50	1. Preterm birth complications [b]	P05, P07, P22, P27-P28
51	2. Birth asphyxia and birth trauma [b]	P03, P10-P15, P20-P21, P24-P26, P29
52	3. Neonatal sepsis and infections	P35-P39 (excluding P37.3, P37.4)
53	4. Other neonatal conditions	P00-P02, P04, P08, P50-P96
54	**E. Nutritional deficiencies**	E00-E02, E40-E46, E50-E64, D50-D53, D64.9
55	1. Protein-energy malnutrition	E40-E46
56	2. Iodine deficiency	E00-E02
57	3. Vitamin A deficiency	E50
58	4. Iron-deficiency anaemia	D50, D64.9
59	5. Other nutritional disorders	D51-D53, E51-E64
60	**II. Noncommunicable diseases [a]**	C00-C97, D00-D48, D55-D64 (minus D 64.9), D65-D89, E03-E07, E10-E16, E20-E34, E65-E88, F01-F99, G06-G98, H00-H61, H68-H93, I00-I99, J30-J98, K00-K92, N00-N64, N75-N98, L00-L98, M00-M99, Q00-Q99, X41-X42[b], X45[b]
61	**A. Malignant neoplasms**	C00-C97
62	1. Mouth and oropharynx cancers [d]	C00-C14
63	2. Oesophagus cancer [d]	C15
64	3. Stomach cancer [d]	C16
65	4. Colon and rectum cancers [d]	C18-C21
66	5. Liver cancer	C22
67	6. Pancreas cancer	C25
68	7. Trachea, bronchus and lung cancers	C33-C34
69	8. Melanoma and other skin cancers [d]	C43-C44
70	9. Breast cancer [d]	C50
71	10. Cervix uteri cancer [d]	C53
72	11. Corpus uteri cancer [d]	C54-C55
73	12. Ovary cancer	C56
74	13. Prostate cancer [d]	C61
75	14. Bladder cancer [d]	C67
76	15. Lymphomas and multiple myeloma [d]	C81-C90, C96
77	16. Leukaemia [d]	C91-C95
78	17. Other malignant neoplasms [d]	C17, C23, C24, C26-C32, C37-C41, C45-C49, C51, C52,C57-C60, C62-C66, C68-C80, C97
79	**B. Other neoplasms**	D00-D48

Code	GHE cause name	ICD-10 code
80	**C. Diabetes mellitus**	E10-E14
81	**D. Endocrine, blood, immune disorders**	D55-D64 (minus D64.9), D65-D89, E03-E07, E15-E34, E65-E88
82	**E. Mental and behavioural disorders**	F04-F99, X41-X42[c], X45[c]
83	1. Unipolar depressive disorders	F32-F33, F34.1
84	2. Bipolar affective disorder	F30-F31
85	3. Schizophrenia	F20-F29
86	4. Alcohol use disorders	F10, X45[c]
87	5. Drug use disorders	F11-F16, F18-F19, X41-X42[c]
88	6. Anxiety disorders	F40-F44
89	7. Eating disorders	F50
90	8. Pervasive developmental disorders	F84
91	9. Childhood behavioural disorders	F90-F92
92	10. Idiopathic intellectual disability	F70-F79
93	11. Other mental and behavioural disorders	F04-F09, F17, F34-F39 (minus F34.1), F45-F48, F51-F69, F80-F83, F88-F89, F93-F99
94	**F. Neurological conditions**	F01-F03, G06 -G98
95	1. Alzheimer's disease and other dementias	F01-F03, G30-G31
96	2. Parkinson disease	G20-G21
97	3. Epilepsy	G40-G41
98	4. Multiple sclerosis	G35
99	5. Migraine	G43
100	6. Non-migraine headache	G44
101	7. Other neurological conditions	G06-G12, G23-G25, G36-G37, G45-G98
102	**G. Sense organ diseases**	H00-H61, H69-H93
103	1. Glaucoma	H40
104	2. Cataracts	H25-H26
105	3. Refractive errors	H49-H52
106	4. Macular degeneration	H35.3
107	5. Other vision loss	H30-H35 (minus H35.3), H53-H54
108	6. Other hearing loss	H90-H91
109	7. Other sense organ disorders	H00-H21, H27, H43-H47, H55-H61, H69-H83, H92-H93
110	**H. Cardiovascular diseases**	I00-I99
111	1. Rheumatic heart disease	I01-I09
112	2. Hypertensive heart disease	I10-I15
113	3. Ischaemic heart disease[e]	I20-I25
114	4. Stroke	I60-I69
115	5. Cardiomyopathy, myocarditis, endocarditis	I30-I33, I38, I40, I42
116	6. Other cardiovascular diseases[e]	I00, I26-I28, I34-I37, I44-I51, I70-I99
117	**I. Respiratory diseases**	J30-J98
118	1. Chronic obstructive pulmonary disease	J40-J44
119	2. Asthma	J45-J46
120	3. Other respiratory diseases	J30-J39, J47-J98
121	**J. Digestive diseases**	K20-K92
122	1. Peptic ulcer disease	K25-K27

Code	GHE cause name	ICD-10 code
123	2. Cirrhosis of the liver	K70, K74
124	3. Appendicitis	K35-K37
125	4. Other digestive diseases	K20-K22, K28-K31, K38-K66, K71-K73, K75-K92
126	**K. Genitourinary diseases**	N00-N64, N75-N76, N80-N98
127	1. Kidney diseases	N00-N19
128	2. Hyperplasia of prostate	N40
129	3. Urolithiasis	N20-N23
130	4. Other genitourinary disorders	N25-N39, N41-N45, N47-N51
131	5. Infertility	N46, N97
132	6. Gynecological diseases	N60-N64, N75-N76, N80-N96, N98
133	**L. Skin diseases**	L00-L98
134	**M. Musculoskeletal diseases**	M00-M99
135	1. Rheumatoid arthritis	M05-M06
136	2. Osteoarthritis	M15-M19
137	3. Gout	M10
138	4. Back and neck pain	M45-M48, M50-M54
139	5. Other musculoskeletal disorders	M00, M02, M08, M11-M13, M20-M43, M60-M99
140	**N. Congenital anomalies**	Q00-Q99
141	1. Neural tube defects	Q00, Q05
142	2. Cleft lip and cleft palate	Q35-Q37
143	3. Down syndrome	Q90
144	4. Congenital heart anomalies	Q20-Q28
145	5. Other chromosomal anomalies	Q91-Q99
146	6. Other congenital anomalies	Q01-Q04, Q06-Q18, Q30-Q34, Q38-Q89
147	**O. Oral conditions**	K00-K14
148	1. Dental caries	K00-K04, K06-K14
149	2. Periodontal disease	K05
150	3. Edentulism	—
151	**III. Injuries**	V01-Y89
152	**A. Unintentional injuries**[f]	V01-X40, X43-X44, X46-59, Y40-Y86, Y88, Y89
153	1. Road injury[g]	V01-V04, V06, V09-V80, V87, V89, V99
154	2. Poisonings	X40, X43-X44, X46-X49
155	3. Falls	W00-W19
156	4. Fire, heat and hot substances	X00-X19
157	5. Drownings	W65-W74
158	6. Exposure to forces of nature	X30-X39
159	7. Other unintentional injuries	Rest of V, W20-W64, W75-W99, X20-X29, X50-X59, Y40-Y86, Y88, Y89
160	**B. Intentional injuries**[f]	X60-Y09, Y35-Y36, Y870, Y871
161	1. Self-harm	X60-X84, Y870
162	2. Interpersonal violence	X85-Y09, Y871
163	3. Collective violence and legal intervention	Y35-Y36

—, not available

[a] Deaths coded to "Symptoms, signs and ill-defined conditions" (R00-R99) are distributed proportionately to all causes within Group I and Group II.

[b] For deaths under age 5, refer to classification in Annex Tables B and C.

[c] As from 2006, deaths from causes F10-F19 with fourth character .0 (Acute intoxication) are coded to the category of accidental poisoning according to the updated ICD-10 instructions.

[d] Cancer deaths coded to ICD categories for malignant neoplasms of other and unspecified sites including those whose point of origin cannot be determined, and secondary and unspecified neoplasms (ICD-10 C76, C80, C97) were redistributed pro-rata across the footnoted malignant neoplasm categories within each age–sex group, so that the category "Other malignant neoplasms" includes only malignant neoplasms of other specified sites (Ref Mathers et al 2006 DCP chapter).

[e] Ischaemic heart disease deaths may be miscoded to a number of so-called cardiovascular "garbage" codes. These include heart failure, ventricular dysrhythmias, generalized atherosclerosis and ill-defined descriptions and complications of heart disease. Proportions of deaths coded to these causes were redistributed to ischaemic heart disease as described in (GPE discussion paper). Relevant ICD-10 codes are I47.2, I49.0, I46, I50, I51.4, I51.5, I51.6, I51.9 and I70.9.

[f] Injury deaths where the intent is not determined (Y10-Y34, Y872) are distributed proportionately to all causes below the group level for injuries.

[g] For countries with 3-digit ICD10 data, for "Road injury" use: V01-V04, V06, V09-V80, V87, V89 and V99. For countries with 4-digit ICD10 data, for "Road injury" use:

V01.1-V01.9, V02.1-V02.9, V03.1-V03.9, V04.1-V04.9, V06.1-V06.9, V09.2, V09.3, V10.3-V10.9, V11.3-V11.9, V12.3-V12.9, V13.3-V13.9, V14.3-V14.9, V15.4-V15.9, V16.4-V16.9, V17.4-V17.9, V18.4-V18.9, V19.4-V19.9, V20.3-V20.9, V21.3-V21.9, V22.3-V22.9, V23.3-V23.9, V24.3-V24.9, V25.3-V25.9, V26.3-V26.9, V27.3-V27.9, V28.3-V28.9, V29.4-V29.9, V30.4.V30.9, V31.4-V31.9, V32.4-V32.9, V33.4-V33.9, V34.4-V34.9, V35.4-V35.9, V36.4-V36.9, V37.4-V37.9, V38.4-V38.9, V39.4-V39.9, V40.4-V40.9, V41.4-V41.9, V42.4-V42.9, V43.4-V43.9, V44.4-V44.9, V45.4-V45.9, V46.4-V46.9, V47.4-V47.9, V48.4-V48.9, V49.4-V49.9, V50.4-V50.9, V51.4-V51.9, V52.4-V52.9, V53.4-V53.9, V54.4-V54.9, V55.4-V55.9, V56.4-V56.9, V57.4-V57.9, V58.4-V58.9, V59.4-V59.9, V60.4-V60.9, V61.4-V61.9, V62.4-V62.9, V63.4-V63.9, V64.4-V64.9, V65.4-V65.9, V66.4-V66.9, V67.4-V67.9, V68.4-V68.9, V69.4-V69.9, V70.4-V70.9, V71.4-V71.9, V72.4-V72.9, V73.4-V73.9, V74.4-V74.9, V75.4-V75.9, V76.4-V76.9, V77.4-V77.9, V78.4-V78.9, V79.4-V79.9, V80.3-V80.5, V81.1, V82.1, V82.8-V82.9, V83.0-V83.3, V84.0-V84.3, V85.0-V85.3, V86.0-V86.3, V87.0-V87.9, V89.2-V89.3, V89.9, V99 and Y850.

Source: WHO methods and data sources for global burden of disease estimates 2000-2011 (Global Health Estimates Technical Paper WHO/HIS/HSI/GHE/2013.4)

Appendix 2 WHO Standard Life Table for Years of Life Lost

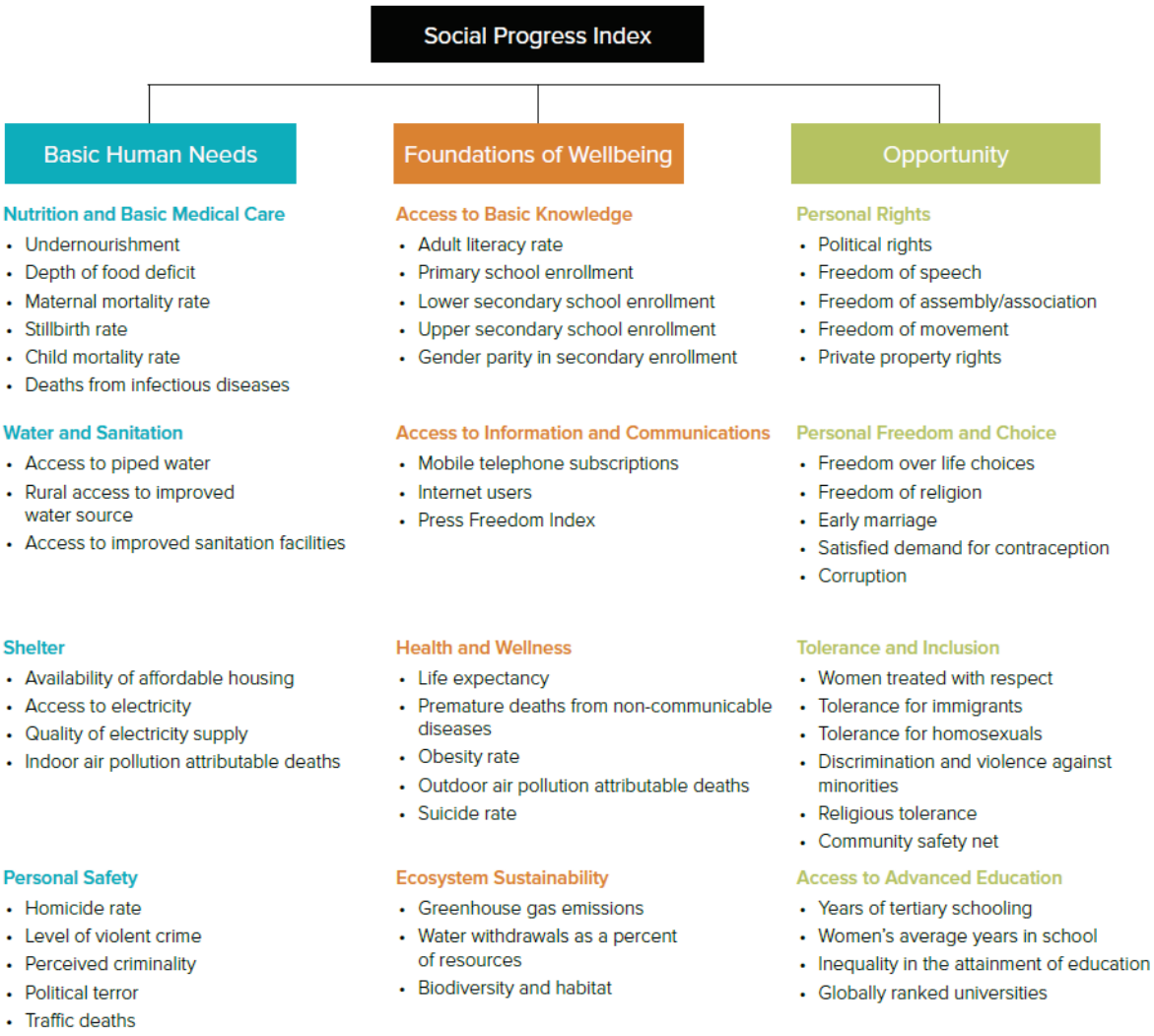
Age	SEYLL*	Age	SEYLL	Age	SEYLL
0	91.94	35	57.15	70	23.15
1	91.00	36	56.16	71	22.23
2	90.01	37	55.17	72	21.31
3	89.01	38	54.18	73	20.40
4	88.02	39	53.19	74	19.51
5	87.02	40	52.20	75	18.62
6	86.02	41	51.21	76	17.75
7	85.02	42	50.22	77	16.89
8	84.02	43	49.24	78	16.05
9	83.03	44	48.25	79	15.22
10	82.03	45	47.27	80	14.41
11	81.03	46	46.28	81	13.63
12	80.03	47	45.30	82	12.86
13	79.03	48	44.32	83	12.11
14	78.04	49	43.34	84	11.39
15	77.04	50	42.36	85	10.70
16	76.04	51	41.38	86	10.03
17	75.04	52	40.41	87	9.38
18	74.05	53	39.43	88	8.76
19	73.05	54	38.46	89	8.16
20	72.06	55	37.49	90	7.60
21	71.06	56	36.52	91	7.06
22	70.07	57	35.55	92	6.55
23	69.07	58	34.58	93	6.07
24	68.08	59	33.62	94	5.60
25	67.08	60	32.65	95	5.13
26	66.09	61	31.69	96	4.65
27	65.09	62	30.73	97	4.18
28	64.10	63	29.77	98	3.70
29	63.11	64	28.82	99	3.24
30	62.11	65	27.86	100	2.79
31	61.12	66	26.91	101	2.36
32	60.13	67	25.96	102	1.94
33	59.13	68	25.02	103	1.59
34	58.14	69	24.08	104	1.28
				105	1.02

*SEYLL: standard expected years of life lost. Based on projected frontier period life expectancy and life table for year 2050 (UN Population Division 2013).

Appendix 3 WHO standard population, used for age standardisation

Age Group (years)	WHO weight
00-04	8,829
05-09	8,660
10-14	8,570
15-19	8,440
20-24	8,191
25-29	7,902
30-34	7,583
35-39	7,125
40-44	6,567
45-49	6,019
50-54	5,351
55-59	4,534
60-64	3,707
65-69	2,950
70-74	2,202
75-79	1,515
80-84	907
85+	633

Appendix 4 Social Progress Index Indicator-level Framework[10]



[10] http://www.socialprogressimperative.org/system/resources/W1siZiIsIjIwMTUvMDQvMDgvMjMvMjMvNTMvNDAyLzIwMTVfU09DSUFMX1BST0dSRVNTX0lOREVYX0ZJTkFMLnBkZiJdXQ/2015%20SOCIAL%20PROGRESS%20INDEX_FINAL.pdf accessed 14 April 2015

Appendix 5 Major groups, minor groups and countries of Asia, Australia*

5	**SOUTH-EAST ASIA**		
	51	**Mainland South-East Asia**	
		5101	Myanmar, The Republic of the Union of
		5102	Cambodia
		5103	Laos
		5104	Thailand
		5105	Vietnam
	52	**Maritime South-East Asia**	
		5201	Brunei Darussalam
		5202	Indonesia
		5203	Malaysia
		5204	Philippines
		5205	Singapore
		5206	Timor-Leste
6	**NORTH-EAST ASIA**		
	61	**Chinese Asia (includes Mongolia)**	
		6101	China (excludes SARs and Taiwan)
		6102	Hong Kong (SAR of China)
		6103	Macau (SAR of China)
		6104	Mongolia
		6105	Taiwan
	62	**Japan and the Koreas**	
		6201	Japan
		6202	Korea, Democratic People's Republic of (North)
		6203	Korea, Republic of (South)
7	**SOUTHERN AND CENTRAL ASIA**		
	71	**Southern Asia**	
		7101	Bangladesh
		7102	Bhutan
		7103	India
		7104	Maldives
		7105	Nepal
		7106	Pakistan
		7107	Sri Lanka
	72	**Central Asia**	
		7201	Afghanistan
		7202	Armenia
		7203	Azerbaijan
		7204	Georgia
		7205	Kazakhstan
		7206	Kyrgyzstan
		7207	Tajikistan
		7208	Turkmenistan
		7211	Uzbekistan

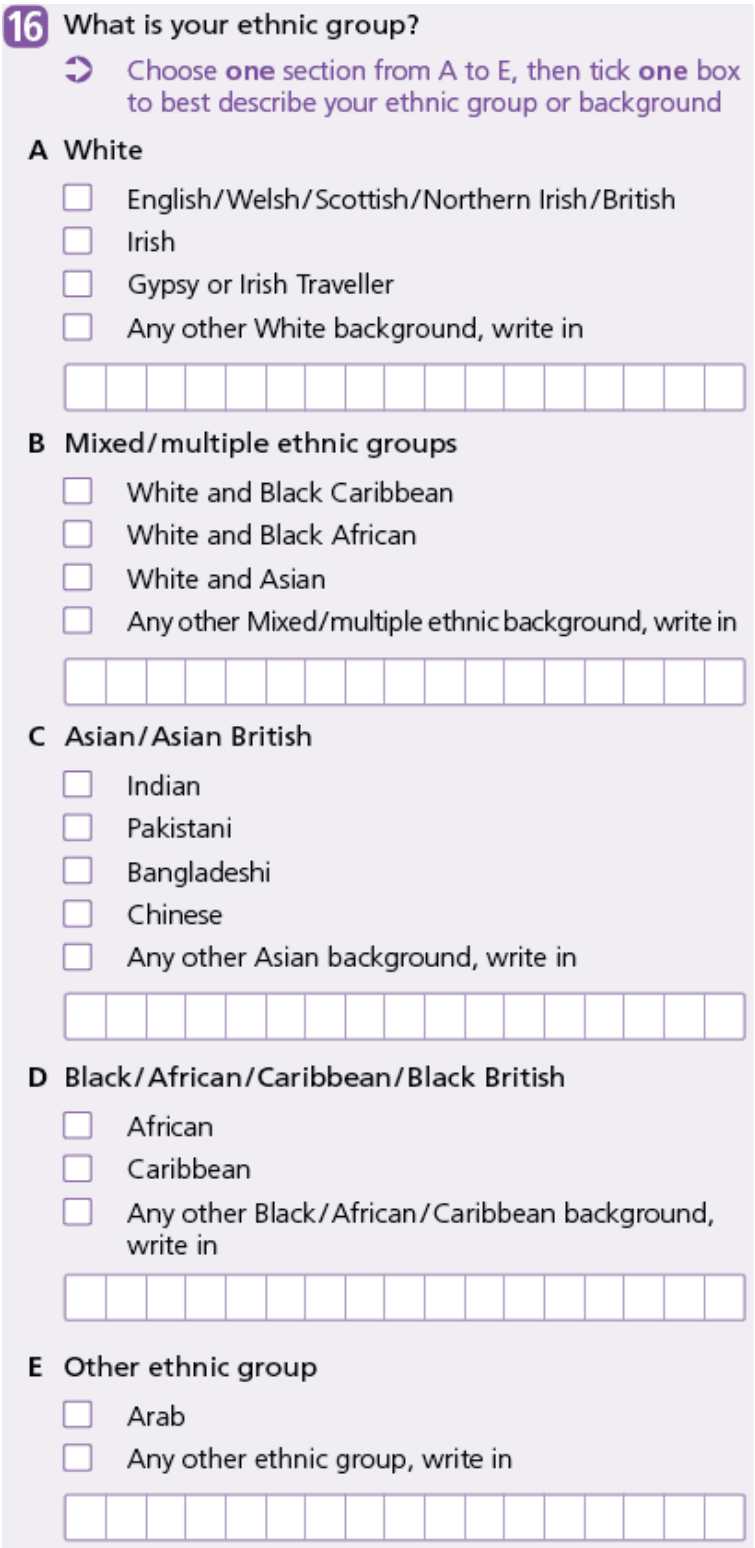
* 1269.0, Standard Australian Classification of Countries, 2011, Version 2.3, Released at 11.30am (Canberra time) 18 August 2014, accessed 2 April 2016

Appendix 6 Definitions used in Canadian Community Health Survey (CCHS)

Indicator	Definition
Hypertension	Population aged 12 and over who reported that they have been diagnosed by a health professional as having high blood pressure.
Diabetes mellitus	1) Population aged 12 and over who reported that they have been diagnosed by a health professional as having Type 1 or Type 2 diabetes. 2) Diabetes includes females 15 and over who reported that they have been diagnosed with gestational diabetes.
Physical inactivity	1) Population aged 12 and over who reported the nature, frequency and duration of their participation in leisure-time physical activity; 2) Respondents are classified as active, moderately active or inactive based on an index of average daily physical activity over the past 3 months. For each leisure time physical activity the respondent is engaged in, an average daily energy expenditure is calculated by multiplying the number of times the activity was performed by the average duration of the activity by the energy cost (kilocalories per kilogram of body weight per hour) of the activity. The index is calculated as the sum of the average daily energy expenditures of all activities. Respondents are classified as follows: 3.0 kcal/kg/day or more = physically active; 1.5 to 2.9 kcal/kg/day = moderately active; less than 1.5 kcal/kg/day = inactive.
BMI	Body mass index (BMI) is a method of classifying body weight according to health risk. According to the World Health Organization (WHO) and Health Canada guidelines, health risk levels are associated with each of the following BMI categories: normal weight = least health risk; underweight and overweight = increased health risk; obese, class I = high health risk; obese, class II = very high health risk; obese, class III = extremely high health risk.
	Body mass index (BMI) is calculated by dividing the respondent's body weight (in kilograms) by their height (in metres) squared.
	A definition change was implemented in 2004 to conform with the World Health Organization (WHO) and Health Canada guidelines for body weight classification. The index is calculated for the population aged 18 and over, excluding pregnant females and persons less than 3 feet (0.914 metres) tall or greater than 6 feet 11 inches (2.108 metres).
	According to the World Health Organization (WHO) and Health Canada guidelines, the index for body weight classification is: less than 18.50 (underweight); 18.50 to 24.99 (normal weight); 25.00 to 29.99 (overweight); 30.00 to 34.99 (obese, class I); 35.00 to 39.99 (obese, class II); 40.00 or greater (obese, class III).
	Body mass index (BMI) for youths is different from that of adults as they are still maturing. This indicator classifies respondents aged 12 to 17 (except female respondents aged 15 to 17 who were pregnant or did not answer the pregnancy question) as "obese" or "overweight" according to the age- and sex-specific BMI cut-off points as defined by Cole and others. The Cole cut-off points have been applied to the Canadian Community Health Survey (CCHS) since 2005 and are based on pooled international data (Brazil, Great Britain, Hong Kong, Netherlands, Singapore and United States) for BMI and linked to the internationally accepted adult BMI cut-off points of 25 (overweight) and 30 (obese).
Smoking	Population aged 12 and over who reported being a current smoker.
	Daily smoker refers to those who reported smoking cigarettes every day.
	Does not take into account the number of cigarettes smoked.
	Occasional smoker refers to those who reported smoking cigarettes occasionally. This includes former daily smokers who now smoke occasionally.
	Data collected for this indicator is based on the question referring to smoking of cigarettes only. Note that data on smoking alternative tobacco products is captured in a different module (TAL).

Source: Statistics Canada, Canadian Community Health Survey (CCHS)

Appendix 7 Question of ethnic group, Census 2011, the UK



16 What is your ethnic group?

Choose **one** section from A to E, then tick **one** box to best describe your ethnic group or background

A White

- ☐ English/Welsh/Scottish/Northern Irish/British
- ☐ Irish
- ☐ Gypsy or Irish Traveller
- ☐ Any other White background, write in

B Mixed/multiple ethnic groups

- ☐ White and Black Caribbean
- ☐ White and Black African
- ☐ White and Asian
- ☐ Any other Mixed/multiple ethnic background, write in

C Asian/Asian British

- ☐ Indian
- ☐ Pakistani
- ☐ Bangladeshi
- ☐ Chinese
- ☐ Any other Asian background, write in

D Black/African/Caribbean/Black British

- ☐ African
- ☐ Caribbean
- ☐ Any other Black/African/Caribbean background, write in

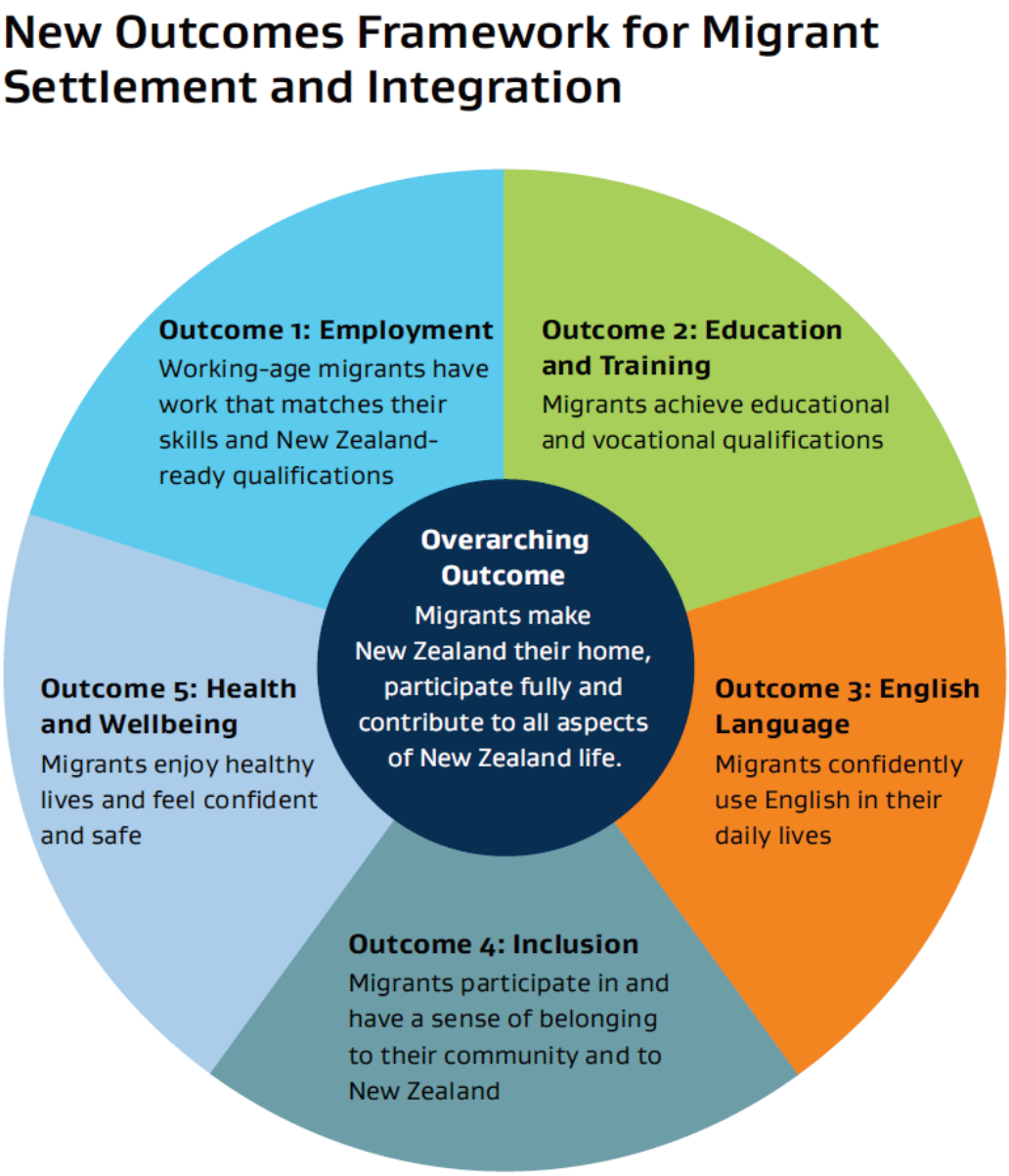
E Other ethnic group

- ☐ Arab
- ☐ Any other ethnic group, write in

Appendix 8 Definitions of the indicators of access to advanced education, Social Progress Index Framework, 2015

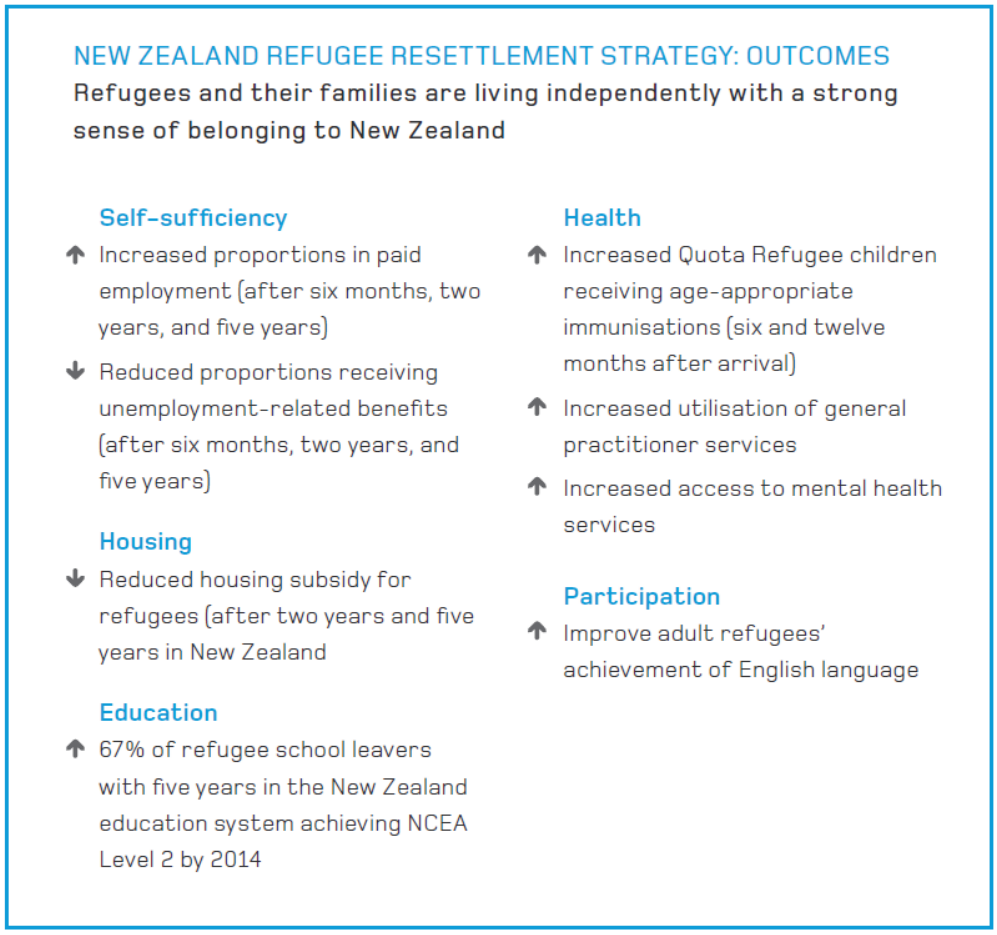
Indicator	Definition	Source	Link
Years of tertiary schooling	The average years of tertiary education completed among people over age 25.	Barro-Lee Educational Attainment Dataset	http://www.barrolee.com/
Women's average years in school	The average number of years of school attended by women between 25 and 34 years old, including primary, secondary and tertiary education.	Institute for Health Metrics and Evaluation	http://www.gapminder.org/data/
Inequality in the attainment of education (0=low; 1=high)	The loss in potential education due to inequality, calculated as the percentage difference between the Human Development Index Education Index, which comprises mean years of schooling and expected years of schooling, and the Inequality-adjusted Education Index.	United Nations Development Programme	http://hdr.undp.org/en/data
Number of globally ranked universities (0=none; 5= >50)	The number of universities ranked on any of the three most widely used international university rankings, measured on a scale from 0 (no ranked universities) to 5 (more than 50 ranked universities).	Times Higher Education World University Rankings, QS World University Rankings, and Academic Ranking of World Universities	http://www.timeshighereducation.co.uk/world-university-rankings/2014-15/world-ranking; http://www.topuniversities.com/university-rankings/world-university-rankings/2014#sorting=rank+region=+country=+faculty=+stars=false+search=; http://www.shanghairanking.com/ARWU2014.html

Appendix 9 The New Zealand Migrant Settlement and Integration Strategy



Source: http://www.immigration.govt.nz/NR/rdonlyres/E869C333-69C1-4983-862B-288C9C493839/0/NewZealandMigrantSettlementandIntegrationStrategy.pdf

Appendix 10 The New Zealand Refugee Resettlement Strategy Outcomes



NEW ZEALAND REFUGEE RESETTLEMENT STRATEGY: OUTCOMES

Refugees and their families are living independently with a strong sense of belonging to New Zealand

Self-sufficiency

- ↑ Increased proportions in paid employment (after six months, two years, and five years)
- ↓ Reduced proportions receiving unemployment-related benefits (after six months, two years, and five years)

Housing

- ↓ Reduced housing subsidy for refugees (after two years and five years in New Zealand

Education

- ↑ 67% of refugee school leavers with five years in the New Zealand education system achieving NCEA Level 2 by 2014

Health

- ↑ Increased Quota Refugee children receiving age-appropriate immunisations (six and twelve months after arrival)
- ↑ Increased utilisation of general practitioner services
- ↑ Increased access to mental health services

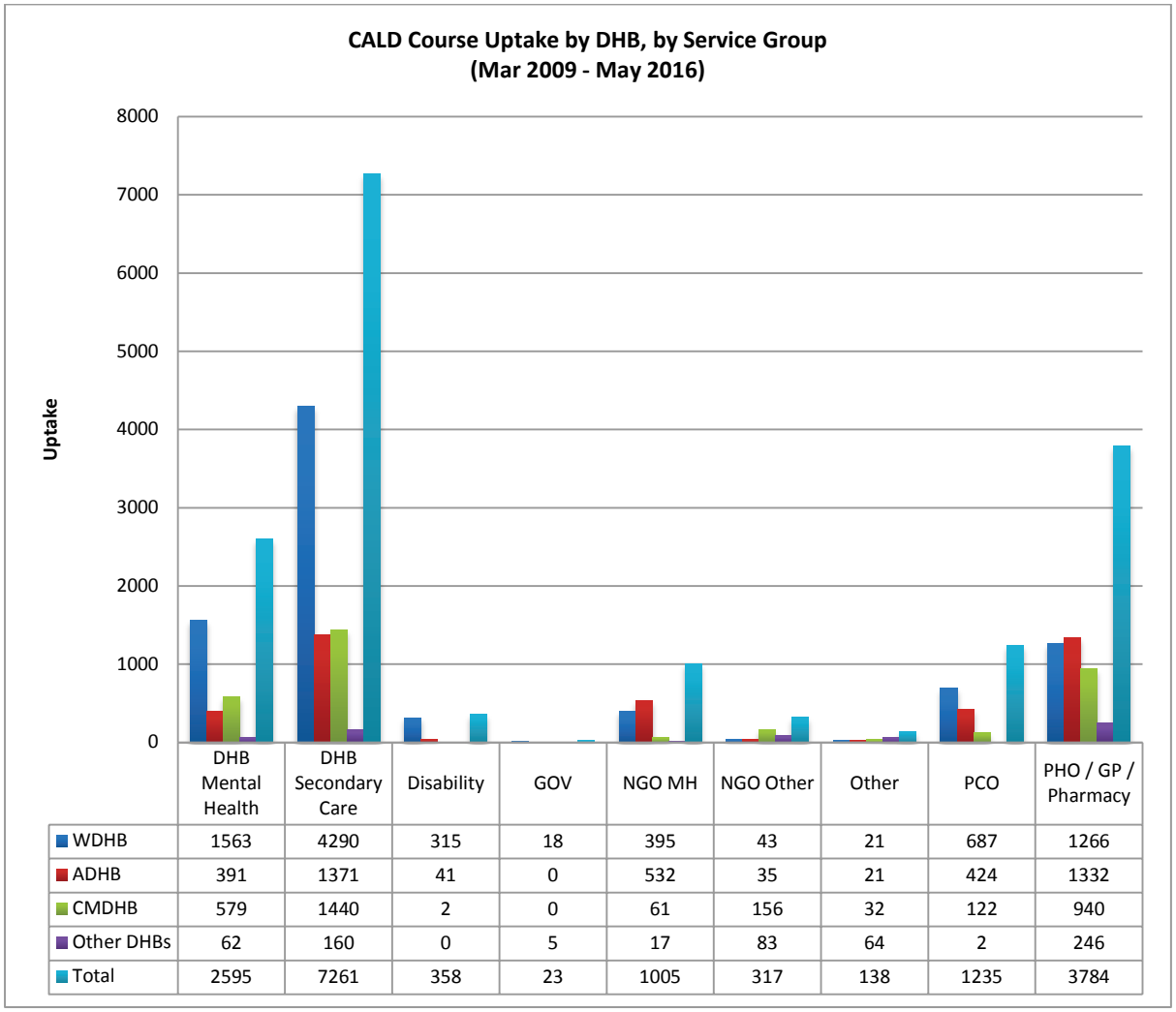
Participation

- ↑ Improve adult refugees' achievement of English language

Source: http://www.immigration.govt.nz/NR/rdonlyres/1F4F5231-0974-430F-AE7A-CD11CAE76227/0/RefugeeResettlementStrategy.pdf

Appendix 11 CALD Course Uptake by DHB, by Service Group (Mar 2009 - May 2016)

DHB	DHB Mental Health	DHB Secondary Care	Disability	GOV	NGO MH	NGO Other	Other	PCO	PHO/GP/ Pharmacy	Total
WDHB	1563	4290	315	18	395	43	21	687	1266	8598
ADHB	391	1371	41	0	532	35	21	424	1332	4147
CMDHB	579	1440	2	0	61	156	32	122	940	3332
Other DHBs	62	160	0	5	17	83	64	2	246	639
Total	2595	7261	358	23	1005	317	138	1235	3784	16716



Source: www.eCALD.com

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