

# Hidden figures and misnomers: a case for disaggregated Asian health statistics in Aotearoa New Zealand to improve health outcomes

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## ABSTRACT

People of Asian ethnicity in Aotearoa New Zealand currently constitute 15% of the population. The majority are migrants. The current sources of data to monitor Asian health in New Zealand are routine population surveys and administrative data. This article highlights the effect of “masking” due to the use of a single “Asian” category for reporting health indicators. Issues regarding the use of the “Other Asian” category in administrative data are also discussed. This discourse provides an impetus to raise questions on how we should be developing policies, strategies and investments to make visible the hidden figures of Asian health statistics in New Zealand. Given that Asian population will become the second largest ethnic group in New Zealand, practical steps need to be taken to strengthen the New Zealand health strategy and enable equitable investment in Asian health.

People of Asian ethnicity are the third largest ethnic group in New Zealand,<sup>1</sup> and addressing their health is increasingly important. The Asian ethnic group in New Zealand comprises of people from a vast geographical area spanning from Afghanistan in the West, to Japan in the East, China in the North and Indonesia in the South.<sup>2</sup> This group currently makes up 15% of the New Zealand population (2018 census).<sup>1</sup> Population projections indicate that the size of the Asian ethnic group in New Zealand is already similar to that for Māori and nearly double the number of Pacific Peoples, and the numbers are increasing progressively (Table 1).<sup>3</sup>

The proportion of the New Zealand population who are migrants (ie, born overseas) has steadily increased from 23% in 2006 to 25% in 2013 and 27% in the 2018 New Zealand census.<sup>4</sup> The majority of migrants are Asian.<sup>4</sup> Voluntary migration to New

Zealand is permitted primarily for maintaining and sustaining economic vibrancy. Hence stringent health screening is imposed to ensure all migrants have a health advantage over the resident population on their arrival to enable economic gain and reduce any burden to the health system. However, it has been found that the health of some migrants declines more rapidly than expected following migration to New Zealand.<sup>5,6</sup>

Immigration is a recognised determinant of health.<sup>7</sup> This relates not only to expected factors, such as health status on arrival, age, gender, marital status, language skills and income, but also to the adoption of unhealthy lifestyle behaviours in the host country, which impacts negatively on the health of migrants.<sup>5,8,9</sup> For example, sibling studies among South Asians have found higher serum cholesterol levels and an increased prevalence of coronary heart

**Table 1:** Projected population by ethnicity, median projection, 30 June 2020–2043.<sup>3</sup>

June year	Māori	Pacific	European/other	Asian	MELAA <sup>a</sup>	Chinese	Indian	Samoan
2020	854,500	430,800	3,529,300	867,300	90,300	300,000	296,300	205,900
2021	874,800	440,100	3,556,800	876,800	92,000	302,200	299,800	210,600
2022	891,300	449,000	3,579,300	902,000	94,700	310,400	307,200	215,100
2023	906,900	457,900	3,599,700	934,300	98,500	319,600	319,400	219,700
2024	922,600	466,800	3,619,800	966,500	102,200	328,900	331,600	224,300
2025	938,300	475,800	3,639,700	998,800	105,900	338,200	343,700	229,000
2026	954,200	484,900	3,659,100	1,030,900	109,600	347,600	355,700	233,700
2027	970,100	494,000	3,678,000	1,063,100	113,400	356,900	367,600	238,400
2028	986,100	503,100	3,696,400	1,095,100	117,100	366,100	379,500	243,200
2029	1,002,300	512,300	3,714,200	1,127,000	120,800	375,400	391,300	248,000
2030	1,018,600	521,600	3,731,300	1,158,900	124,500	384,500	403,100	252,900
2031	1,035,000	530,900	3,747,700	1,190,700	128,100	393,600	414,800	257,900
2032	1,051,500	540,400	3,763,300	1,222,500	131,800	402,600	426,600	262,900
2033	1,068,100	549,900	3,778,300	1,254,200	135,600	411,500	438,400	268,000
2034	1,084,900	559,400	3,792,600	1,285,900	139,300	420,300	450,200	273,100
2035	1,101,800	569,100	3,806,100	1,317,600	143,000	429,000	462,100	278,200
2036	1,118,800	578,800	3,819,100	1,349,400	146,800	437,700	474,100	283,500
2037	1,135,900	588,600	3,831,400	1,381,200	150,600	446,300	486,300	288,700
2038	1,153,200	598,500	3,843,100	1,413,100	154,400	454,800	498,500	294,000
2039	1,170,600	608,500	3,854,300	1,445,200	158,200	463,400	510,900	299,400
2040	1,188,200	618,500	3,865,000	1,477,400	162,100	471,900	523,400	304,900
2041	1,205,900	628,700	3,875,100	1,509,700	166,000	480,500	536,100	310,400
2042	1,223,700	638,900	3,884,600	1,542,200	170,000	489,000	549,000	316,000
2043	1,241,600	649,300	3,893,500	1,574,900	174,000	497,600	562,000	321,600

<sup>a</sup> Middle Eastern/Latin American/African

disease among those who migrated to the UK compared with their siblings who remained in India.<sup>10</sup>

In New Zealand, the health of the Asian ethnic group is not well understood. Although much progress has been made since 2006 to address Asian health issues,<sup>11</sup> a number of challenges persist.<sup>12–14</sup> Current sources of data for monitoring Asian health in New Zealand include routinely collected population surveys and administrative data. Nevertheless, there are several important issues regarding how data are collected and reported for New Zealand Asians, which is the focus of this article. The arguments raised in this article are based on available health statistics for the South Asian people in New Zealand and use certain health indicators as examples, but the same arguments will hold for other health issues and for East and South East Asians who are at higher risk for other disorders, such as certain cancers.<sup>15</sup>

### Asian health indicators from population surveys

The continued use of the single “Asian” category when reporting data from population health surveys, such as the New Zealand Health Survey (NZHS), obscures a true description of the health of this diverse population group. In fact, due to the effect of averaging, this practice grossly masks subgroup differences in health indicators, risk factors and disease prevalence.<sup>16</sup> For example, the prevalence of obesity was 16% for Asians in both the 2011–2013<sup>17</sup> and 2019/20<sup>18</sup> NZHSs. In addition to not using the World Health Organization (WHO) ethnic specific body mass index (BMI) categories to define obesity,<sup>19</sup> these surveys did not disaggregate the Asian ethnic group. A secondary analysis of the 2011–2013 data<sup>6</sup> clearly showed the effect of “masking.” When “Asian” was subdivided and ethnic specific BMI categories were used to define obesity, the prevalence of obesity among adults was 57% in South Asians, 25% in Chinese and 33% in the “Other” Asian group.<sup>6</sup>

In the 2008/09 Adult Nutrition Survey, data for Asians were not reported at all, but combined with the “European/Other” category.<sup>20</sup> However, secondary analysis of these data clearly showed subgroup differences in the prevalence of overweight/obesity and diagnosed diabetes within the

Asian ethnic group.<sup>5</sup> Asians were sub-categorised as “South Asians” (people from India, Sri Lanka, Pakistan, Afghanistan, Nepal, Bangladesh, Fijian Indians) and “East and South East Asians” (people from China, Hong Kong, Malaysia, Singapore, Indonesia, Vietnam, Cambodia, Philippines, Thailand, Korea, Japan, Myanmar, Tibet). The prevalence of obesity was 66% and 56% in South Asian men and women, respectively, compared to 37% and 22% in East and South East Asian men and women.<sup>5</sup> The prevalence of diagnosed diabetes was 23% and 21% in South Asian men and women, respectively, in contrast to less than 1% in East and South East Asian men and women.<sup>5</sup>

Data from the NZHS series also show that the prevalence of “unmet need for primary health care” among Asians has increased over the last decade from 21.1% to 24.2%, with a significantly marked increase among Asian men (15.3% to 22.6%).<sup>17</sup> Disaggregated data from the 2011–12 and 2012–13 NZHSs (combined) for Asian subgroups indicate that a lower proportion of South Asians (88%), Chinese (87%) and Other Asian (82%) had a health practice or service to access, if unwell.<sup>6</sup> Poor access to healthcare was even more evident among new Asian migrants (those resident in New Zealand for less than five years), of whom only 62% reported being enrolled in a primary health organisation (PHO), in contrast to 91% of those who had lived in New Zealand for between 5 and 10 years and 93% of those who had lived in New Zealand for over 10 years.<sup>6</sup> These statistics suggest that new Asian migrants have a poor understanding of the New Zealand health system. This is compounded by cultural differences and poor English language proficiency, which in itself is a risk factor for the loss of the healthy migrant status enjoyed by new migrants. Hence understanding health issues using high-quality ethnicity data for Asians is imperative.

### Asian health indicators from administrative data

As discussed above, grouping Asians together (level 1 ethnicity code) reduces prevalence estimates of disease for some groups. Using level 2 ethnicity codes can also mask disease prevalence in certain Asian subgroups. Healthcare administrative data usually record main ethnic groups only.

For example, PHO enrolment forms include ethnicity but only provide options for the largest Asian subgroups, namely Indian, Chinese and “Other Asian.” The “Other Asian” category is a mixed group of South Asians, East Asians and South East Asians.<sup>3</sup> Indians make up 87% of South Asians,<sup>1</sup> and as noted above, South Asians have a high prevalence of obesity and diabetes.<sup>5</sup> This means that the high rates of obesity and diabetes among the other 13% of South Asians (Sri Lanka, Pakistan and Bangladesh) are obscured in PHO data, as they are captured as part of the “Other Asian” category.

Examples of studies using administrative data include the papers reporting cardiovascular disease incidence<sup>21</sup> and mortality rates<sup>22</sup> and publications from the PREDICT study. In a recent PREDICT publication,<sup>23</sup> Indians made up 8% of the 475,241 adults in the New Zealand primary care study population, and 10% were “Other Asians.” The prevalence of diabetes among Indians was higher (33% in women and 24% in men) than that of “Other Asians” (21% in women and 15% in men), which included South Asians from Sri Lanka, Pakistan and Bangladesh, who have a similar prevalence of diabetes to Indians, and people from Japan, Korea and other East and South East Asian countries, among whom diabetes is relatively uncommon.<sup>5</sup>

The use of the “Indian” group to make inferences for the South Asian group as a whole is an emerging practice, which has led to the inappropriate use of the category “South Asian” in making international comparisons. For instance, in 2017 Rabanal et al<sup>24</sup> used the data from the New Zealand PREDICT study, which has information on “Indians” only, to make comparisons with South Asians in Norway. Further, the ethnicity classification used in Norway for South Asian is not consistent with that used in New Zealand. For example, in Norway people from Myanmar are considered South Asian, whereas in New Zealand they are considered South East Asian.<sup>3</sup> Such inconsistent definitions of South Asian in New Zealand and other migrant-receiving countries pose a challenge for international comparisons. The use of the term “South Asian” to represent just one ethnicity, for example Indian, should be avoided to reduce

ambiguity in interpreting research findings. Having a well-defined “South Asian” ethnic category to report health data in New Zealand will perhaps stimulate similar thinking and action in other migrant-receiving countries, such as the UK, Norway, USA and Canada, and improve international comparisons of health indicators.

### The case for disaggregated Asian health statistics

By combining all Asians into one group, the overall poor metabolic health of South Asians is obscured. For example, in a secondary analysis of the NZHS data, South Asians were found to have a five- to six-fold increased risk of being on treatment for diabetes.<sup>6</sup> Similar findings have been observed in the USA,<sup>25</sup> Canada,<sup>26</sup> UK<sup>27</sup> and Norway,<sup>28</sup> where migrants from Sri Lanka and Pakistan (predominant South Asians in Norway) have a more than five-fold higher risk of diabetes and cardiovascular disease compared with the majority population and other migrant groups world-wide. International multi-ethnic studies have also found the prevalence of diabetes to be higher in younger (20–29-year-old) South Asians compared to other minority (Chinese, African American and Hispanic) and majority (European) ethnic groups.<sup>29</sup> In addition, national hospitalisation and mortality data in New Zealand suggest that Indians have a higher prevalence and incidence of cardiovascular disease when compared to NZ Europeans.<sup>21</sup> Cardiovascular disease mortality rates are significantly higher among people of Indian ethnicity compared to New Zealand Europeans<sup>22</sup> and other Asian subgroups in New Zealand, such as Chinese people.<sup>30</sup> Among New Zealand women who had been screened for gestational diabetes and birthed at National Women’s Health, the prevalence of gestational diabetes was reported to be the highest among Indian women (20%) compared to “Other Asian” (18%), Pacific (12%), Māori (8%) and European (4%) women.<sup>31</sup> Non-alcoholic fatty liver disease is also an emerging issue for the South Asian population.<sup>32</sup>

The examples provided in this discourse provide strong evidence that New Zealand is inadequately addressing Asian health by using a “broad-brush” approach via its level 1 and 2 ethnicity classifications. These high-

level categories ignore the subtleties and nuances seen in different Asian cultures, which from a health perspective may under-recognise and under-address certain conditions in some groups leading to greater harm. One can argue ethnicity classifications are developed based on the size of the population groups in a country. South Asians currently make up 6% of the total New Zealand population, and East and South East Asians make up 9%.<sup>1</sup> These figures are similar for New Zealand Pacific Peoples, who currently make up 8% of the New Zealand population,<sup>1</sup> and provide the rationale for disaggregated level 1 ethnicity codes for the “Asian” group as “South Asians” and “East and South East Asians”.<sup>5</sup> This will enable unmasked reporting of health statistics, which will pave the way to equitable health outcomes for New Zealand Asians.

The health disparity observed for South Asians is a serious concern for New Zealand. While South Asian migrants are healthier than the resident population on arrival, their subsequent poor health lowers their overall wellbeing and productivity. An early loss of their healthy migrant status is therefore counterproductive towards the main objective of migration and poses an increased burden on individuals, families and the health system. Government and policy response to New Zealand Asians has been sporadic and limited at best. The current New Zealand Health Strategy (2017–2027) acknowledges this limitation<sup>33</sup> but has no road map to address it. This provides the impetus to raise questions on how we should be developing policies, strategies and invest-

ments to make visible the hidden figures of Asian health statistics in New Zealand. Given that Asians are nearly the second largest ethnic group in New Zealand,<sup>3</sup> practical steps need to be taken to strengthen the New Zealand Health Strategy to enable equitable investment into Asian health. Developing appropriate level 1 and 2 ethnicity codes for Asians and reporting health statistics in a disaggregated form would be a pragmatic way forward. To improve the visibility of health issues, the collection of disaggregated health survey data for Asian subgroups will better enable policies and programmes to address unmet health needs. In addition, using more detailed ethnicity codes (level 3 or 4) for patient enrolment forms in primary and secondary healthcare would be critical for capturing health information to inform actions to address the health needs of Asians in New Zealand.

In conclusion, equitable health outcomes for New Zealand Asians are only possible by identifying and developing appropriate, cost-effective and ethnic-specific health-promoting approaches. Using revised ethnicity codes and disaggregated health statistics to understand post-migration health trajectories and associated risk factors of Asian subgroups would be critical to achieve this. It would also provide much needed information for informing policies and programmes both for research and health promotion initiatives to address Asian health in New Zealand in a pragmatic, translational manner and to reduce health disparity for this fast-growing population in New Zealand.

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Nil.

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**REFERENCES**

1. Statistics New Zealand [Internet]. Ethnic group (detailed total response - level 4), by age group and sex, for the census usually resident population count, 2006, 2013, and 2018 Censuses. 2019. Available from: <http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE8338>
2. Statistics New Zealand [Internet]. Ethnicity New Zealand Standard Classification 2005V2.1.0. Available from: <http://aria.stats.govt.nz/aria/#ClassificationView:uri=http://stats.govt.nz/cms/ClassificationVersion/YVqOcFHSIguKkT17>
3. Statistics New Zealand [Internet]. Population projected to become more ethnically diverse. Available from: <https://www.stats.govt.nz/news/population-projected-to-become-more-ethnically-diverse>
4. Statistics New Zealand [Internet]. Birthplace (broad geographic areas) and years since arrival in New Zealand by age and sex, for the overseas born census usually resident population count, 2006, 2013, and 2018 Censuses (RC, TA, SA2, DHB) 2020. Available from: [http://nzdotstat.stats.govt.nz/wbos/index.aspx?ga=2.194604781.1109808399.1620695530-1637168086.1462318868&gac=1.60112351.1620695602.Cj0KcQjws-OEBhCkARIsAPhOkIbTBbukLLTS5DisIpKbUKAqdKn2pLMnkSI2ypGHquWXEGMEjH0mqccaAsJUEALw\\_wcB#](http://nzdotstat.stats.govt.nz/wbos/index.aspx?ga=2.194604781.1109808399.1620695530-1637168086.1462318868&gac=1.60112351.1620695602.Cj0KcQjws-OEBhCkARIsAPhOkIbTBbukLLTS5DisIpKbUKAqdKn2pLMnkSI2ypGHquWXEGMEjH0mqccaAsJUEALw_wcB#)
5. Parackal S, Smith C, Parnell WR. A profile of New Zealand 'Asian' participants of the 2008/09 Adult National Nutrition Survey: focus on dietary habits, nutrient intakes and health outcomes. *Public Health Nutr*. 2015 18(05):893-904.
6. Scragg R. Asian Health in Aotearoa in 2011-2013: trends since 2002-2003 and 2006-2007. Auckland: Northern Regional Alliance Ltd, 2016.
7. Fuller-Thomson E, Noack AM, George U. Health decline among recent immigrants to Canada: findings from a nationally representative longitudinal survey. *Can J Public Health*. 2011;102(4):273-80. doi: 10.1007/BF03404048.
8. Montesi L, Caletti MT, Marchesini G. Diabetes in migrants and ethnic minorities in a changing World. *World J Diabetes*. 2016;7(3):34-44. doi: 10.4239/wjd.v7.i3.34.
9. Agyemang C, van den Born BJ. Non-communicable

- diseases in migrants: an expert review. *J Travel Med.* 2019;26(2):tay107. doi: 10.1093/jtm/tay107.
10. Bhatnagar D, Anand IS, Durrington PN, Patel DJ, Wander GS, Mackness MI, Creed F, Tomenson B, Chandrashekhkar Y, Winterbotham M, et al. Coronary risk factors in people from the Indian subcontinent living in west London and their siblings in India. *Lancet.* 1995;345(8947):405-9. doi: 10.1016/s0140-6736(95)90398-4.
  11. Ministry of Health [Internet]. Asian health chart book 2006. Wellington: Ministry of Health; 2006. Available from: <http://www.moh.govt.nz/moh.nsf/indexmh/asian-health-chart-book-2006>
  12. Rasanathan K, Ameratunga S, Tse S. Asian health in New Zealand—progress and challenges. *N Z Med J.* 2006;119(1244):U2277. PMID: 17072352.
  13. Wong A. Challenges for Asian health and Asian health promotion in New Zealand, Auckland: Health Promotion Forum of New Zealand; 2015. Available from: <http://www.hauora.co.nz/~hpforum/assets/files/Occasional Papers/15128 FINAL Health promotion forum Asian promotion article.pdf>
  14. Liao R. In the shadow of exclusion: the state of New Zealand Asian health. *N Z Med Stud J.* 2019. 29:32-36.
  15. Tran HN, Li Y, Udaltsova N, Armstrong MA, Friedman GD, Klatsky AL. Risk of cancer in Asian Americans: a Kaiser Permanente cohort study. *Cancer Causes Control.* 2016;27(10):1197-207. doi: 10.1007/s10552-016-0798-2.
  16. Rasanathan K, Craig D, Perkins R. The novel use of 'Asian' as an ethnic category in the New Zealand health sector. *Ethn Health.* 2006;11(3):211-27. doi: 10.1080/13557850600565525.
  17. Ministry of Health. The Health of New Zealand Adults 2011/12: Key findings of the New Zealand Health Survey. Wellington: Ministry of Health, 2012.
  18. Ministry of Health [Internet]. New Zealand Health Survey: Annual Data Explorer. Available from: [https://minhealthnz.shinyapps.io/nz-health-survey-2019-20-annual-data-explorer/\\_w\\_1683f56e/#/](https://minhealthnz.shinyapps.io/nz-health-survey-2019-20-annual-data-explorer/_w_1683f56e/#/) Nov 2020.
  19. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet.* 2004;363:157-63.
  20. University of Otago and Ministry of Health. A Focus on Nutrition: Key findings of the 2008/09 New Zealand Adult Nutrition Survey. 2011 Wellington: Ministry of Health.
  21. Chan WC, Wright C, Riddell T, Wells S, Kerr A, Gala G et al. Ethnic and socio-economic disparities in the prevalence of cardiovascular disease in New Zealand. *N Z Med J.* 2008;12(1285):3341
  22. Perumal L, Wells S, Ameratunga S, Pylypchuk D. Markedly different clustering of CVD risk factors in New Zealand Indian and European people but similar risk scores (PREDICT-14). *Aust N Z J Public Health.* 2012;36(2):141-4.
  23. Selak V, Poppe K, Grey C, Mehta S, Winter-Smith J, Jackson R, Wells S, Exeter D, Kerr A, Riddell T, Harwood M. Ethnic differences in cardiovascular risk profiles among 475,241 adults in primary care in Aotearoa, New Zealand. *N Z Med J.* 2020;133(1521):14-27.
  24. Rabanal KS, Meyer HE, Tell GS, et al. Can traditional risk factors explain the higher risk of cardiovascular disease in South Asians compared to Europeans in Norway and New Zealand? Two cohort studies. *BMJ Open* 2017;7:e016819. doi:10.1136/bmjopen-2017-016819
  25. Shah AD, Vittinghoff E, Kandula NR, Srivastava S, Kanaya AM. Correlates of prediabetes and type II diabetes in US South Asians: findings from the Mediators of Atherosclerosis in South Asians Living in America (MASALA) study. *Annals of Epidemiology.* 2015;25(2):77-83.
  26. Creatore MI, Moineddin R, Booth G, Manuel DH, DesMeules M, McDermott S, et al. Age-and sex-related prevalence of diabetes mellitus among immigrants to Ontario, Canada. *Can Med Assoc J* 2010; 182(8):781-9.
  27. Gholap N, Davies M, Patel K, Sattar N, Khunti K. Type 2 diabetes and cardiovascular disease in South Asians. *Primary Care Diabetes.* 2011;5(1):45-56.
  28. Jenum AK, Diep LM, Holmboe-Ottesen G, Holme IM, Kumar BN, Birkeland KI. Diabetes susceptibility in ethnic minority groups from Turkey, Vietnam, Sri Lanka and Pakistan compared with Norwegians—the association with adiposity is strongest for ethnic minority women. *BMC Public Health.* 2012;12(1):1.
  29. C.Ke P, Sohal H, Qian H, Quan, Khan NA.

- Diabetes in the young: a population-based study of South Asian, Chinese and White people. *Diabet. Med.* 2015;32:487-96.
30. Jatrana S, Richardson K, Blakely T, Dayal S. Does mortality vary between Asian subgroups in New Zealand: an application of hierarchical Bayesian modelling? *PloS One.* 2014; 9(8):e105141
  31. National Women's Health Annual Clinical Report 2018 [Internet]. Available from: <https://nationalwomenshealth.adhb.govt.nz/healthprofessionals/annual-clinical-report/national-womens-annual-clinical-report/>
  32. Singh S, Kuftinec GN, Sarkar S. Non-alcoholic fatty liver disease in South Asians: A review of literature. *J Clin Transl Hepatol.* 2017;5(1):76-81.
  33. Ministry of Business, Innovation and Employment and Ministry of Health [Internet]. 2017. New Zealand Health Research Strategy 2017-2027. Wellington: Ministry of Business, Innovation and Employment and Ministry of Health. Available from: <https://www.health.govt.nz/publication/new-zealand-health-research-strategy-2017-2027>