Supplemental materials:

1. Information collected in the Well Person's Health Check (WPHC)

The WPHC was a cross-sectional survey conducted in 26 rural and remote Indigenous communities in the Bowen, Cairns, Cape York, Torres Strait and Mount Isa Health Service Districts in north Queensland between March 1998 and December 2000. The information collected in the WPHC screening including:

Demography: Participants provided their full name, date of birth, residential address, and self-identified as Indigenous or non-Indigenous.

Anthropometry: Participants were weighted and measured for height, waist and hip circumference.

Blood pressure: Blood pressure was measured using a Dinamap model 800 automated blood pressure monitor. Three separate measurements were recorded over approximately a 10-minute period.

Interview questions: Participants were assisted to recall food eaten in the 24 hours prior to the screen, and the number of serves of fruit and vegetables was recorded. Physical activity was measured using a seven day recall method. Participants were asked if they had diabetes diagnosed by a doctor, chronic heart, lung or kidney conditions, and the year in which these conditions were diagnosed. All participants were asked if they were taking vitamin supplements, any medication and whether they had symptoms indicative STI. Tobacco smoking and alcohol consumption information were asked.

Specimen collection and analysis: Fasting venous blood samples were collected. The following biochemical measurements were made: triglycerides, total cholesterol, high density lipoprotein C, low density lipoprotein, gamma-glutamyl transferase, red cell folate, fasting glucose and rapid plasma regain. Participants were asked to provide urine sample. A range of testing were conducted using the sample, including protein, PH, leucocytes, albumin creatinine ration, etc.

More information about the WPHC could be found in the paper:

Leonard D, McDermott R, Miller G, Muller R, McCulloch B, Arabena K. The Well Person's Health Check: a population screening program in indigenous communities in north Queensland. Australian Health Review. 2002;25(6):136.

2. ICD and procedure codes used to identify CVD events*—

- **CHD**, including

  MI

  angina pectoris

  coronary insufficiency

  → icd9: 4100-4149 (except 4110)
  icd10: I200-I259 (except I241)

  CHD death → death of cause

- **Stroke** → icd9: 4330-4359, 4370
  icd10: G450-G468 (except G454)
  I600-I672 (except I620-I629, I671)

- **Congestive heart failure** → icd9: 4280-4289
  icd10: I500-I509
  I110, I130, I132

- **Peripheral vascular disease** → icd9: 4400-4417 (except 4412, 4414, 4416)
  4439, 4440-4449
  icd10: I700-I718 (except I712, I714, I716)
  I739-I749

Procedure codes for CVD → icd9: 3600-3699
icd10: 3270000-3271801, 3273000-3275701, 3276300-3276303, 3276305- 3276314, 3276316-3276319, 3305000-3305500, 3307500-3310000, 3311200 -3313000, 3315100-3316300, 3317800-3355400, 3530306-3530501, 3530906 -3531501, 3845619, 3849700-3850900, 3863700, 9020100-9020103 9022900-9023000

*ICD 9 codes were used for diagnosis in 1998 and part of diagnosis in 1999 in the dataset, so we have used both ICD version 9 and 10 to identify CVD events.

3. An example of using the recalibrated 2008 Framingham CVD model

Table A Regression coefficients in the Framingham study

	Women	Men
Log of age	2.32888	3.06117
Log of total cholesterol	1.20904	1.12370
Log of HDL	-0.70833	-0.93263
Log of SBP if not treated*	2.76157	1.93303
Log of SBP if treated	2.82263	1.99881
Smoking	0.52873	0.65451
Diabetes	0.69154	0.57367

*High blood pressure treated rate in the Framingham cohort is 0.1176 and 0.1013 for women and men respectively

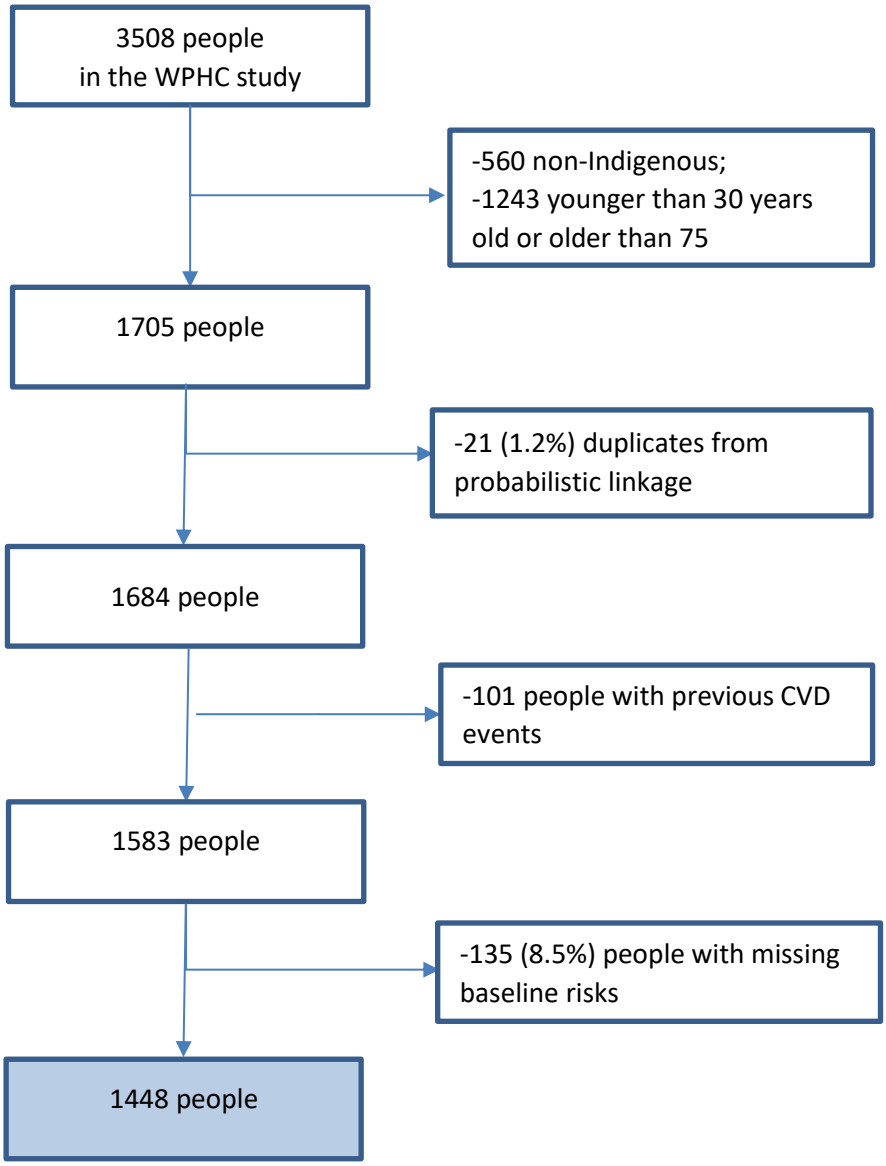
For a 50-year-old Indigenous woman who is not treated for high blood pressure, with total cholesterol of 4.65 mmol/L (180 mg/dL), HDL of 1.16 mmol/L (45 mg/dL), systolic blood pressure of 140 mm Hg, who is a current smoker and has no diabetes, the calculation of 5-year absolute CVD risk based on the recalibrated 2008 Framingham equation is:

$\sum \beta_i X_i$=2.32888*log(50) + 1.20904*log(180) - 0.70833*log(45) + 2.76157*log(140) + 2.82263*0 + 0.52873*1 + 0.69154*0 = 26.8682

$\sum \beta_i M_i$=2.32888*log(45.2) + 1.20904*log(194.0) - 0.70833*log(44.0) + 2.76157*log(133.0)*(1-0.1176) + 2.82263*log(133.0)*0.1176 + 0.52873*0.471 + 0.69154*0.250 = 26.5263

P=1-0.931^exp(26.8682-26.5263) ≈ 9.6%

4. Flow chart of the sample selection process and final sample used to validate and recalibrate the Framingham models



5. Sensitivity analysis on the probability of CVD events

ECG-LVH:

The prevalence of ECG-LVH is 1% in the Framingham cohort. If we presume the prevalence in our sample is 10 times greater than in the Framingham cohort, the Framingham 1991 model predicted 5-year and 10-year CVD risk would be 7.1% (95% CI: 6.7-7.5) and 14.8% (95% CI: 14.1-15.4) respectively. This is slightly higher compared to the results in main results (6.8% and 14.2%) but still significantly underestimated compared to the observed probability of CVD in the WHPC cohort.

Hypertension treatment:

The prevalence of hypertension treatment is 11.76% for women and 10.13% for men in the Framingham cohort. If we presume all people in our cohort were treated for hypertension, the Framingham 2008 model predicted 10-year CVD risk would be 12.1% (95% CI: 11.4-12.7), which is similar to the result in main text (12.0%) and still significantly underestimated compared to the observed probability of CVD in the WHPC cohort.

Multiple imputation:

Results with multiple imputation are similar to the ones in the main text:

Table B 5-year and 10-year probability of CVD events in the WPHC indigenous sample, with multiple imputation

	Sample size, n	Observed probability, % (95% CI)	Predicted probability, % (95% CI)		
			Framingham 1991	Framingham 2008	Recalibrated Framingham 2008
5-year risk					
Total	1583	9.4 (8.0-11.0)	6.7 (6.4-7.1)	NA*	10.4 (9.9-10.9)
Gender					
Female	822	8.7 (7.0-10.9)	5.7 (5.2-6.1)	NA*	9.6 (8.9-10.3)
Male	761	10.1 (8.1-12.5)	7.8 (7.3-8.4)	NA*	11.3 (10.5-12.1)
Age group					
30-34	327	3.2 (1.8-5.9)	1.3 (1.8-5.9)	NA*	2.9 (2.7-3.1)
35-44	541	3.7 (2.4-5.8)	3.7 (3.4-4.0)	NA*	6.2 (5.8-6.6)
45-54	377	13.0 (9.9-16.9)	7.9 (7.3-8.5)	NA*	11.8 (11.1-12.6)
55-74	338	20.3 (16.3-25.1)	15.4 (14.5-16.4)	NA*	22.9 (21.4-24.3)
10-year risk					
Total	1583	17.7 (15.8-19.8)	14.0 (13.4-14.7)	11.9 (11.3-12.5)	21.2 (20.3-22.1)
Gender					
Female	822	16.7 (14.1-19.6)	12.1 (11.3-12.9)	8.8 (8.2-9.5)	19.6 (18.4-20.8)
Male	761	18.9 (16.1-22.0)	16.1 (15.1-17.1)	15.2 (14.2-16.2)	22.9 (21.6-24.3)
Age group					
30-34	327	7.8 (5.2-11.7)	3.6 (3.2-4.0)	3.3 (3.1-3.6)	6.6 (6.1-7.1)
35-44	541	11.3 (8.7-14.6)	8.7 (8.2-9.3)	7.2 (6.7-7.7)	13.6 (12.8-14.4)
45-54	377	23.7 (19.5-28.6)	17.0 (16.0-17.9)	13.9 (12.9-14.8)	24.9 (23.5-26.3)
55-74	338	30.9 (26.0-36.4)	29.4(27.9-30.8)	25.5 (23.8-27.2)	43.3 (41.2-45.4)

6. Recalibrated 5-year risk scores under different HDL levels

Using the recalibrated 2008 Framingham CVD model, the 5-year CVD risk of an "average" male or female (with risk factors equal to those reported in table 1, total cholesterol 5 times of HDL level) can be found in table C.

Table C Recalibrated risk score of an average person using different HDL levels

HDL, mg/dL	Risk score for females	Difference from HDL of 45 mg/dL, females	Risk score for males	Difference from HDL of 45 mg/dL, males
20	6.2%	-2.9%	7.3%	-1.2%
25	6.9%	-2.2%	7.7%	-0.8%
30	7.5%	-1.6%	7.9%	-0.6%
35	8.1%	-1.0%	8.1%	-0.4%
40	8.6%	-0.5%	8.3%	-0.2%
45	9.1%	0.0%	8.5%	0.0%
50	9.6%	0.5%	8.7%	0.2%
55	10.0%	0.9%	8.8%	0.3%
60	10.4%	1.3%	9.0%	0.5%
65	10.8%	1.7%	9.1%	0.6%
70	11.2%	2.1%	9.2%	0.7%

We used the fixed HDL level of 45 mg/dL (1.2mmol/L) to build the Indigenous CVD chart. By varying HDL levels by ± 25 mg/dL (0.6 mmol/L), the change in risk score ranged from -2.9% to 2.1%, and -1.2% to 0.7% for females and males respectively, which would have a minimal impact on the risk classifications for the chart.