Supplemental Material

We specify the full equations and parameter values used in our model in this Supplemental Material.

1 Model structure

Individuals in each country's population were organized by age group (30-39, 40-49, 50-59, 60-69, and in sensitivity analyses, 70-85 years old), sex, and location (urban and rural). Individuals in the model were provided with values for the key additional risk factors beyond age and sex necessary to calculate their 10-year combined risk CVD score for MI and stroke (systolic blood pressure, total cholesterol, diabetes status, tobacco smoking status, and history of prior CVD events) using a multivariate sampling procedure that takes into account the correlation among age, sex, location, and risk factor values for each individual as well as time trends in risk factor values (Monte Carlo sampling with copulas[1] from the distributions listed in Supplemental Tables 3-9 and correlation matrix in Supplemental Table 11). In each year of the 10-year simulation, individuals were simulated as experiencing an MI or stroke

event and death based on their individual risk score for each type of event, case fatality, and location taking account of secular trends in risk factors (Supplemental Table 10). Those individuals experiencing a MI or stroke event had a probability of death from the event based on case fatality rates specific to their age, sex, and location (Supplemental Table 12),[2,3] to capture the quality of existing treatment infrastructure. Those individuals who have an event but do not die have a 50% elevated odds of subsequent events.[4] Individuals also experienced an annual probability of death from other causes, based on WHO estimates specific to age, sex and location (Supplemental Table 13).[5]

Because MI and stroke account for just over 90% of blood-pressure-related diseases in China and India, we did not include other morbidity and mortality estimates from conditions caused by high blood pressure. The quantitative effect size estimates of blood pressure treatment on these other conditions is so poorly estimated from available data that including these additional outcomes was judged likely to provide poor quality model projections while not informing the differential benefit between treatment approaches.[6] Moreover, the relationship between risk factors and the outcomes of MI/stroke are parallel to the relationship between the risk factors and the outcomes of congestive heart failure, claudication, and chronic kidney disease.[7–9]

2 WHO risk calculation approach

The WHO 10-year cardiovascular risk calculation approach proceeds as follows, using the equations originally derived by Lim and colleagues.[10,11] First, to generate each individual's risk factor profile, a random number r is sampled from a normal distribution of mean 0 and standard deviation 1. For each continuous risk factor i (systolic blood pressure, total cholesterol), the individual's risk factor value (i.e., their individual systolic blood pressure in mmHg or total cholesterol in mmol/L) is determined by the following function form:

(1) $$x_i = e^{(r\sigma_i + \mu_i)}$$

where x is the continuous risk factor value (e.g., the systolic blood pressure) for the individual for risk factor i, σ is the transformed standard deviation of the risk factor in the individual's cohort (age-, sex-, and urban/rural-specific group) that year, and μ is the transformed mean value of the risk factor in the individual's cohort that year. The variable σ is multiplied by r to transform the sampled random normal distribution

(mean 0 and standard deviation 1) to the standard deviation of the risk factor, then added to μ to shift the mean of the distribution to the risk factor's mean value. Transformations are used to correct for the right-skewed nature of the risk factor distributions. The transformations are as follows:

(2) $$m_i = \ln(w_i^2) - \frac{\ln(w_i^2 + d_i^2)}{2}$$

and

(3) $$s_i = \ln\sqrt{\ln(d_i^2) + e^{2\ln(w_i)}} - 2\ln(w_i)$$

where ω is the mean and δ is the standard deviation of risk factor i's distribution for the individual's cohort that year.

For dichotomous risk factors (tobacco smoking, diabetes, previous ischemic heart disease, and previous cerebrovascular disease), an individual is assigned to have that risk factor with a probability r equal to the prevalence of the risk factor in the individual's cohort that year,

taking into account the standard deviation around the prevalence, as specified in the tables below.

To capture dependence among the risk factors (e.g., to capture the fact that individuals with diabetes are also more likely to have high cholesterol), we use a multivariate normal distribution with the covariance matrix given in Supplemental Table 11.

To update the risk factor profiles between years of the simulation, we carry over pre-existing conditions (diabetes, coronary artery disease, and cerebrovascular disease) from one year to the next and track individuals over time for consistence (e.g., an individual with high blood pressure will continue to have high blood pressure rather than a blood pressure randomly resampled from the population distribution each year), updating their prevalence for age-related and secular trends (Supplemental Table 10). To achieve this consistency between years, we record a variable that captures the rank of each individual's risk in the cohort (e.g., the person with highest systolic blood pressure has rank #1 in the systolic blood pressure rank list). Then the individual with the highest risk factor value in one year will get the highest value sampled for that risk factor

in the next year, and the individual with the second highest risk factor value will get the second highest sample, etc. This technique prevents survival bias during the subsequent mortality calculation described below, as individuals who are high risk are less likely to survive to later years.

An individual's risk of myocardial infarction death, stroke death or other death is calculated each year as a function of the individual's risk profile. The individual's relative hazard λ, the hazard of death from disease j in relation to the typical hazard in the cohort that year, is defined by:

(4) $$l_j = e^{\sum_i b_i x_i}$$

where β is the log of the relative risk of each disease contributed by each risk factor i (Supplemental Table 14) and x is the value of the risk factor for the individual that year.

To determine individual risk for myocardial infarction or stroke, the population-level cohort- and year-specific mortality rate ρ for each disease j is multiplied by the ratio of the individual's relative hazard λ and the

mean relative hazard ψ in that individual's cohort that year for that disease:

(5) $$k_j = r_j \frac{I_j}{y_j}$$

where I is the incidence rate for the given disease j (coronary disease, cerebrovascular disease) for the individual that year, provided by the Global Burden of Disease estimates for mortality corrected for case fatality rate to estimate incidence. The probability of an individual's death in a given year is given by the case fatality rate, using a competing risks algorithm to account not only for CVD mortality but also the probability of death from other causes by age (Supplemental Tables 12-13). We did not further adjust the probability of non-CVD mortality by baseline blood pressure or other CVD risk factors, as insufficient data were available to adjust the probability of death from non-CVD causes by CVD risk factor.

When implementing the model, we did not adjust the meta-analytic treatment effectiveness estimates to interact with an individual's level of overall CV risk or by their baseline blood pressure, as one of the meta-analyses explored whether effectiveness varied by baseline risk or blood

pressure level and found no significant interactions between effectiveness and these pre-treatment covariates.[12]

All simulated prescriptions followed the WHO guidelines,[13] which recommend a thiazide diuretic or angiotensin converting enzyme (ACE) inhibitor for people under 55 years old or with diabetes, and a thiazide diuretic or calcium channel blocker (CCB) for older people, using standard WHO-recommended dosages (as dosage adjustment has small effects on outcomes[14]). Initial drug choice and prescription order were randomly varied.

3 Appendix References

1. Hofert M, Mächler M. Nested Archimedean copulas meet R: The nacopula package. *J Stat Softw*. 2011;39:1–20.

2. Moran A, Gu D, Zhao D, Coxson P, Wang YC, Chen C-S, Liu J, Cheng J, Bibbins-Domingo K, Shen Y-M, He J, Goldman L. Future Cardiovascular Disease in China Markov Model and Risk Factor Scenario Projections From the Coronary Heart Disease Policy Model–China. *Circ Cardiovasc Qual Outcomes*. 2010;3:243–252.

3. Shah B, Kumar N, Menon GR. Assessment of the burden of non-communicable diseases. Ansari Nagar: Indian Council of Medical Research; 2010.

4. Brønnum-Hansen H, Jørgensen T, Davidsen M, Madsen M, Osler M, Gerdes LU, Schroll M. Survival and cause of death after myocardial infarction. *J Clin Epidemiol*. 2001;54:1244–1250.

5. World Health Organization. World Health Organization Mortality Database. Geneva: WHO; 2014.

6. Sussman J, Vijan S, Hayward R. Using benefit-based tailored treatment to improve the use of antihypertensive medications. *Circulation*. 2013;:epub ahead of print.

7. Echouffo-Tcheugui JB, Kengne AP. Risk models to predict chronic kidney disease and its progression: a systematic review. 2012 [cited 2015 Jun 17];Available from: http://dx.plos.org/10.1371/journal.pmed.1001344

8. Kannel WB, D'Agostino RB, Silbershatz H, Belanger AJ, Wilson PW, Levy D. Profile for estimating risk of heart failure. *Arch Intern Med*. 1999;159:1197–1204.

9. Murabito JM, D'Agostino RB, Silbershatz H, Wilson PW. Intermittent claudication a risk profile from the Framingham heart study. *Circulation*. 1997;96:44–49.

10. Mendis S, Lindholm LH, Mancia G, Whitworth J, Alderman M, Lim S, Heagerty T. World Health Organization (WHO) and International Society of Hypertension (ISH) risk prediction charts: assessment of cardiovascular risk for prevention and control of cardiovascular disease in low and middle-income countries. *J Hypertens*. 2007;25:1578–1582.

11. Lim SS, Gaziano TA, Gakidou E, Reddy KS, Farzadfar F, Lozano R, Rodgers A. Prevention of cardiovascular disease in high-risk individuals in low-income and middle-income countries: health effects and costs. *The Lancet*. 2007;370:2054–2062.

12. The Blood Pressure Lowering Treatment Trialists' Collaboration. Blood pressure-lowering treatment based on cardiovascular risk: a meta-analysis of individual patient data. *The Lancet*. 2014;384:591–598.

13. World Health Organization. Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low-Resource Settings. Geneva: WHO; 2013.

14. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo Jr JL, Jones DW, Materson BJ, Oparil S, Wright Jr JT. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. *Jama*. 2003;289:2560–2571.

15. United Nations. World Population Prospects: The 2012 Revision. Geneva: UN; 2013.

16. Basu S, Millett C. Social epidemiology of hypertension in middle-income countries determinants of prevalence, diagnosis, treatment, and control in the WHO SAGE study. *Hypertension*. 2013;62:18–26.

17. Popkin BM, Du S, Zhai F, Zhang B. Cohort Profile: The China Health and Nutrition Survey—monitoring and understanding socio-economic and health change in China, 1989–2011. *Int J Epidemiol*. 2010;39:1435–1440.

18. World Health Organization, others. Global Infobase online. Geneva: WHO; 2015.

19. Kowal P, Chatterji S, Naidoo N, Biritwum R, Fan W, Ridaura RL, Maximova T, Arokiasamy P, Phaswana-Mafuya N, Williams S, others. Data resource profile: the World Health Organization Study on global AGEing and adult health (SAGE). *Int J Epidemiol*. 2012;41:1639–1649.

20. Barendregt JJ, Van Oortmarssen GJ, Vos T, Murray CJ. A generic model for the assessment of disease epidemiology: the computational basis of DisMod II. *Popul Health Metr*. 2003;1:4.

21. Wu Z, Yao C, Zhao D, Wu G, Wang W, Liu J, Zeng Z, Wu Y. Sino-MONICA Project A Collaborative Study on Trends and Determinants in Cardiovascular Diseases in China, Part I: Morbidity and Mortality Monitoring. *Circulation*. 2001;103:462–468.

22. Salomon JA, Vos T, Hogan DR, Gagnon M, Naghavi M, Mokdad A, Begum N, Shah R, Karyana M, Kosen S, others. Common values in assessing health outcomes from disease and injury: disability weights measurement study for the Global Burden of Disease Study 2010. *The Lancet*. 2013;380:2129–2143.

23. Pandian JD, Sudhan P. Stroke Epidemiology and Stroke Care Services in India. *J Stroke*. 2013;15:128–134.

24. Lv Y, Fang X, Asmaro K, Liu H, Zhang X, Zhang H, Qin X, Ji X. Five-year Prognosis after Mild to Moderate Ischemic Stroke by Stroke Subtype: A Multi-Clinic Registry

Study. *PLoS ONE* [Internet]. 2013 [cited 2015 Jul 7];8. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3817184/

25. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, Abraham J, Adair T, Aggarwal R, Ahn SY, others. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *The Lancet*. 2013;380:2095–2128.

Supplemental Table 1: Anticipated size of each population in age-, sex-, and location-specific (urban/rural) cohorts in year 2016, in (A) China and (B) India.[15] Because these are estimates from demographic modeling, each estimate has both a mean and a standard deviation from the demographic model, based on resampling from uncertainty ranges around fertility and mortality estimates.

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	60,637,773	382,371	56,291,482	354,964	53,343,003	336,372	49,519,574	312,262
40-49	63,747,402	401,980	59,178,224	373,167	56,078,542	353,621	52,059,040	328,275
50-59	45,867,033	289,229	42,579,454	268,499	40,349,195	254,435	37,457,114	236,198
60-69	27,209,257	171,577	25,258,998	159,279	23,935,963	150,936	22,220,322	140,117
70-85	19,046,480	120,104	17,681,299	111,495	16,755,174	105,655	15,554,225	98,082

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	33,604,771	207,805	31,411,042	194,239	68,989,538	426,617	64,485,994	398,768
40-49	25,064,453	154,993	23,428,239	144,875	51,456,534	318,196	48,097,521	297,425

50-59	15,307,265	94,657	14,308,002	88,478	31,425,333	194,328	29,373,930	181,642
60-69	10,556,773	65,281	9,867,624	61,019	21,672,723	134,019	20,257,957	125,271
70-85	4,940,360	30,550	4,617,852	28,556	10,142,404	62,718	9,480,322	58,624

Supplemental Table 2: Anticipated size of each population in age-, sex-, and location-specific (urban/rural) cohorts in year 2025, in (A) China and (B) India.[15]

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	62,361,941	1,223,785	57,892,068	1,136,069	54,859,752	1,076,563	50,927,608	999,399
40-49	65,559,989	1,286,544	60,860,891	1,194,329	57,673,073	1,131,772	53,539,281	1,050,650
50-59	47,171,211	925,684	43,790,154	859,334	41,496,480	814,323	38,522,166	755,956
60-69	27,982,922	549,134	25,977,210	509,775	24,616,556	483,073	22,852,132	448,448
70-85	19,588,046	384,394	18,184,047	356,842	17,231,589	338,151	15,996,492	313,914

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	36,756,996	772,989	34,357,488	722,528	75,460,956	1,586,923	70,534,966	1,483,331
40-49	27,415,571	576,542	25,625,875	538,905	56,283,305	1,183,622	52,609,207	1,106,357
50-59	16,743,131	352,103	15,650,134	329,118	34,373,120	722,857	32,129,289	675,670
60-69	11,547,029	242,831	10,793,236	226,979	23,705,687	498,524	22,158,212	465,981

70-85	5,403,780	113,640	5,051,020	106,222	11,093,791	233,299	10,369,604	218,070

Supplemental Table 3: Distribution of systolic blood pressure (mmHg) in (A) China and (B) India.[16,17] The distributions reflect pre-treatment pressure.

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	122.7	16.4	115.5	14.2	134.0	18.8	127.4	18.4
40-49	129.6	16.8	123.7	17.2	135.3	19.4	134.3	22.3
50-59	135.9	21.2	132.8	19.8	142.3	22.8	145.2	24.0
60-69	141.4	21.3	143.0	22.8	150.8	24.9	154.7	26.6
70-85	144.7	21.5	149.1	24.3	153.4	25.3	159.5	29.8

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	116.2	11.9	109.7	12.2	116.5	12.2	110.3	12.9
40-49	119.8	14.8	116.3	15.9	119.1	14.4	116.5	16.6
50-59	126.1	17.6	124.4	19.2	124.9	17.8	123.0	20.0
60-69	133.0	20.4	132.9	21.5	130.3	21.0	130.2	22.1
70-85	137.6	21.5	137.1	22.5	135.1	21.0	137.1	23.3

Supplemental Table 4: Distribution of diastolic blood pressure (mmHg) in (A) China and (B) India.[16,17] The distributions reflect pre-treatment pressure.

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	78.7	12.5	75.8	10.2	84.3	14.2	81.7	11.9
40-49	85.8	13.3	82.3	12.5	85.2	13.0	83.5	13.6
50-59	88.0	14.2	83.9	13.3	86.9	13.8	85.5	14.0
60-69	86.6	13.8	85.4	13.5	87.0	14.1	85.9	14.0
70-85	83.2	13.5	83.7	14.0	83.6	14.4	83.7	15.2

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	77.6	9.5	73.5	9.5	77.3	9.5	73.0	9.3
40-49	80.1	10.6	76.9	10.7	79.2	10.5	76.6	11.1
50-59	82.2	11.3	80.2	11.3	81.4	11.7	79.0	11.8
60-69	83.4	11.9	81.8	12.4	81.9	12.3	80.6	12.3
70-85	82.7	11.8	81.0	12.7	81.3	12.9	81.6	13.3

Supplemental Table 5: Total cholesterol (mmol/L) in (A) China and (B) India.[17,18]

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	4.79	0.89	4.37	0.85	4.70	0.97	4.43	0.87
40-49	4.98	0.99	4.74	0.82	4.93	1.03	4.73	0.92
50-59	4.86	0.96	5.16	0.93	4.98	0.99	5.21	1.05
60-69	4.92	0.88	5.30	1.07	4.83	0.91	5.27	1.04
70-85	4.78	0.88	5.22	1.00	4.79	0.90	5.28	1.02

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	5.51	1.01	5.46	1.00	5.08	0.92	4.89	0.66
40-49	5.67	1.06	5.75	1.12	5.13	0.74	5.10	0.89
50-59	5.80	1.15	5.94	1.15	4.80	0.52	4.96	0.75
60-69	5.81	1.19	5.97	1.09	4.68	0.47	4.81	0.52
70-85	5.81	1.19	5.97	1.09	4.68	0.47	4.81	0.52

Supplemental Table 6: Tobacco smoking prevalence in (A) China and (B) India.[19]

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	57.70%	4.69%	3.02%	1.34%	60.57%	4.26%	5.32%	1.81%
40-49	62.00%	3.02%	4.15%	1.02%	68.57%	2.66%	2.97%	0.93%
50-59	47.60%	1.49%	2.54%	0.43%	66.85%	1.20%	3.03%	0.43%
60-69	36.20%	1.67%	4.03%	0.62%	55.58%	1.65%	8.47%	1.12%
70-85	23.07%	1.48%	8.38%	0.95%	51.11%	2.06%	15.98%	2.13%

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	40.80%	6.46%	4.40%	1.19%	56.10%	3.39%	3.76%	0.68%
40-49	47.80%	5.38%	2.30%	0.99%	63.70%	2.78%	9.69%	1.25%
50-59	50.40%	2.99%	2.54%	0.84%	60.80%	1.74%	9.90%	1.00%
60-69	44.30%	3.49%	1.30%	0.80%	57.10%	2.05%	12.20%	1.46%
70-85	34.30%	4.61%	0.80%	0.89%	48.10%	2.91%	11.55%	2.33%

Supplemental Table 7: Diabetes prevalence (diagnosed) in (A) China and (B) India.[19]

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	0.00%	0.00%	0.28%	5.30%	1.10%	10.10%	0.44%	6.70%
40-49	2.60%	15.90%	4.20%	20.00%	1.90%	13.50%	2.00%	14.10%
50-59	7.00%	25.50%	7.10%	25.80%	1.30%	11.30%	2.90%	16.70%
60-69	13.10%	33.80%	13.10%	33.80%	3.90%	19.30%	4.80%	21.30%
70-85	13.40%	34.10%	12.20%	32.70%	2.00%	14.10%	5.90%	23.50%

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	1.30%	1.29%	1.68%	0.69%	1.65%	0.73%	0.88%	0.30%
40-49	6.10%	2.28%	3.20%	1.08%	5.77%	1.13%	2.10%	0.54%
50-59	17.00%	2.00%	6.58%	1.20%	6.06%	0.72%	4.30%	0.58%
60-69	12.60%	2.08%	8.65%	1.74%	6.75%	0.87%	3.70%	0.72%
70-85	11.20%	2.73%	18.25%	3.49%	4.22%	0.98%	3.90%	1.20%

Supplemental Table 8: Prevalence of prior MI in (A) China and (B) India.[3,18,20]

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	4.76%	2.93%	2.83%	1.43%	4.98%	1.44%	2.19%	0.61%
40-49	7.77%	3.03%	4.99%	1.63%	6.77%	0.70%	3.05%	1.08%
50-59	10.77%	4.14%	7.15%	1.56%	8.56%	0.92%	3.90%	0.05%
60-69	13.78%	5.29%	9.31%	2.03%	10.35%	1.12%	4.76%	0.07%
70-85	16.79%	6.45%	11.47%	2.50%	12.14%	1.31%	5.62%	0.08%

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	3.01%	1.85%	3.57%	1.80%	1.56%	0.45%	1.34%	0.37%
40-49	6.53%	2.55%	8.56%	2.79%	1.93%	0.20%	3.10%	1.10%
50-59	12.78%	4.91%	13.23%	2.89%	2.89%	0.31%	5.04%	0.07%
60-69	17.37%	6.67%	17.54%	3.83%	7.11%	0.77%	6.74%	0.10%
70-85	17.37%	6.67%	17.54%	3.83%	7.11%	0.77%	6.74%	0.10%

Supplemental Table 9: Prevalence of prior stroke in (A) China and (B) India.[3,18,20]

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	0.09%	0.01%	0.11%	0.01%	0.05%	0.01%	0.07%	0.01%
40-49	0.96%	6.13%	0.69%	4.41%	0.45%	2.90%	0.39%	2.52%
50-59	1.83%	1.32%	1.27%	0.92%	0.85%	0.62%	0.71%	0.52%
60-69	2.70%	0.55%	1.84%	0.38%	1.25%	0.26%	1.03%	0.21%
70-85	3.57%	0.08%	2.42%	0.05%	1.65%	0.04%	1.35%	0.03%

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	0.00%	0.00%	0.02%	0.02%	0.00%	0.00%	0.02%	0.02%
40-49	0.05%	0.32%	0.05%	0.32%	0.05%	0.32%	0.05%	0.32%
50-59	0.58%	0.42%	0.58%	0.42%	0.58%	0.42%	0.58%	0.42%
60-69	0.88%	0.18%	0.88%	0.18%	0.88%	0.18%	0.88%	0.18%
70-85	0.91%	0.02%	0.91%	0.02%	0.91%	0.02%	0.91%	0.02%

Supplemental Table 10: Estimated linear secular trends in risk factor levels per year in (A) China and (B) India.[18,20] The trends reflect the percent change in the baseline values shown in Supplemental Tables 3-10 of each risk factor by demographic group, per year.

(A)

Age	Gender	Location	SBP	Tot Chol	HDL	Tobacco	DM	CHD	Stroke
30-39	Male	Urban	0.58%	0.07%	0.01%	-0.02%	0.23%	0.05%	0.00%
40-49	Male	Urban	0.32%	0.04%	0.01%	0.00%	0.30%	0.03%	-0.27%
50-59	Male	Urban	0.29%	0.06%	0.01%	0.02%	0.07%	0.04%	-0.01%
60-69	Male	Urban	0.29%	0.07%	0.01%	0.11%	0.29%	0.05%	0.01%
70-85	Male	Urban	0.29%	0.07%	0.01%	-0.50%	0.15%	0.04%	-0.03%
30-39	Male	Rural	0.58%	0.07%	0.02%	-0.02%	0.23%	0.05%	0.00%
40-49	Male	Rural	0.32%	0.04%	0.01%	0.00%	0.30%	0.02%	-0.27%
50-59	Male	Rural	0.29%	0.06%	0.02%	0.02%	0.07%	0.02%	-0.01%
60-69	Male	Rural	0.29%	0.07%	0.02%	0.11%	0.29%	0.01%	0.01%
70-85	Male	Rural	0.29%	0.07%	0.02%	-0.50%	0.15%	0.03%	-0.03%
30-39	Female	Urban	0.48%	0.18%	0.04%	-0.19%	0.37%	0.05%	-0.47%
40-49	Female	Urban	0.25%	0.08%	0.02%	-0.01%	0.66%	0.02%	-0.11%
50-59	Female	Urban	0.18%	0.21%	0.04%	0.22%	0.09%	0.01%	0.00%
60-69	Female	Urban	0.20%	0.13%	0.03%	0.19%	0.16%	0.05%	0.00%
70-85	Female	Urban	0.20%	0.13%	0.03%	0.19%	0.07%	0.04%	0.05%
30-39	Female	Rural	0.48%	0.18%	0.04%	-0.19%	0.37%	0.05%	-0.47%
40-49	Female	Rural	0.25%	0.08%	0.02%	-0.01%	0.66%	0.03%	-0.11%
50-59	Female	Rural	0.18%	0.21%	0.05%	0.22%	0.09%	0.04%	0.00%
60-69	Female	Rural	0.20%	0.13%	0.04%	0.19%	0.16%	0.04%	0.00%
70-85	Female	Rural	0.20%	0.13%	0.04%	0.19%	0.07%	0.03%	0.05%

(B)

Age	Gender	Location	SBP	Tot Chol	HDL	Tobacco	DM	CHD	Stroke
30-39	Male	Urban	0.62%	0.06%	0.01%	-0.03%	0.00%	0.08%	0.00%
40-49	Male	Urban	0.35%	0.04%	0.01%	0.00%	0.13%	0.04%	-0.52%
50-59	Male	Urban	0.33%	0.05%	0.01%	0.02%	0.03%	0.03%	-0.03%
60-69	Male	Urban	0.35%	0.06%	0.01%	0.09%	0.30%	0.04%	0.03%
≥70	Male	Urban	0.38%	0.06%	0.01%	-0.34%	0.18%	0.04%	-0.12%
30-39	Male	Rural	0.60%	0.06%	0.03%	-0.01%	0.04%	0.04%	0.00%
40-49	Male	Rural	0.33%	0.03%	0.01%	0.00%	0.39%	0.01%	-0.37%
50-59	Male	Rural	0.33%	0.05%	0.02%	0.02%	0.08%	0.01%	-0.02%
60-69	Male	Rural	0.34%	0.06%	0.02%	0.34%	0.44%	0.01%	0.02%
≥70	Male	Rural	0.32%	0.06%	0.02%	-0.52%	0.10%	0.02%	-0.08%
30-39	Female	Urban	0.56%	0.21%	0.04%	-0.21%	0.25%	0.16%	0.00%
40-49	Female	Urban	0.29%	0.09%	0.02%	-0.01%	0.22%	0.07%	-0.10%
50-59	Female	Urban	0.22%	0.25%	0.05%	0.24%	0.02%	0.03%	0.00%
60-69	Female	Urban	0.25%	0.16%	0.04%	0.18%	0.09%	0.07%	0.00%
≥70	Female	Urban	0.25%	0.16%	0.04%	0.20%	0.03%	0.07%	0.09%
30-39	Female	Rural	0.50%	0.19%	0.05%	-0.27%	0.19%	0.08%	-0.17%
40-49	Female	Rural	0.29%	0.09%	0.02%	0.00%	0.63%	0.03%	-0.86%
50-59	Female	Rural	0.22%	0.25%	0.06%	0.07%	0.06%	0.03%	0.00%
60-69	Female	Rural	0.25%	0.16%	0.04%	0.13%	0.21%	0.03%	0.00%
≥70	Female	Rural	0.25%	0.17%	0.04%	0.26%	0.11%	0.03%	0.07%

Supplemental Table 11: Correlations matrix among risk factors.[11]

	Systolic blood pressure	Diastolic blood pressure	Total cholesterol	Tobacco exposure	Diabetes	Coronary heart disease	Cerebrovascular disease
Systolic blood pressure	1	0.725	0.174	-0.096	0.087	0.037	0.045
Diastolic blood pressure	0.725	1	0.126	-0.070	0.063	0.027	0.033
Total cholesterol	0.174	0.126	1	-0.107	0.098	0.014	0.012
Tobacco exposure	-0.096	-0.070	-0.107	1	-0.034	-0.003	-0.003
Diabetes	0.087	0.063	0.098	-0.034	1	0.037	0.031
Coronary heart disease	0.037	0.027	0.014	-0.003	0.037	1	0.2
Cerebrovascular disease	0.045	0.033	0.012	-0.003	0.031	0.2	1

Supplemental Table 12: Case fatality rates for (A) myocardial infarction and (B) stroke.[2,3,21]

(A)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	0.30	0.18	0.50	0.25	0.30	0.09	0.50	0.14
40-49	0.34	0.13	0.46	0.15	0.34	0.04	0.46	0.16
50-59	0.38	0.15	0.43	0.09	0.38	0.04	0.43	0.01
60-69	0.43	0.17	0.47	0.10	0.43	0.05	0.47	0.01
70-85	0.49	0.19	0.54	0.12	0.49	0.05	0.54	0.01

(B)

Age (years)	Male urban		Female urban		Male rural		Female rural	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
30-39	0.23	0.03	0.25	0.02	0.23	0.03	0.25	0.02
40-49	0.27	1.71	0.25	1.60	0.27	1.71	0.25	1.60
50-59	0.34	0.24	0.29	0.21	0.34	0.24	0.29	0.21
60-69	0.41	0.08	0.38	0.08	0.41	0.08	0.38	0.08
70-85	0.47	0.01	0.45	0.01	0.47	0.01	0.45	0.01

Supplemental Table 13: All-cause death rates in (A) China and (B) India.[5]

(A)

Age (years)	Male		Female	
	Mean	SD	Mean	SD
30-34 years	0.000717	0.000108	0.000641	0.000063
35-39 years	0.000994	0.000093	0.000862	0.000042
40-44 years	0.001734	0.000123	0.001392	0.000053
45-49 years	0.002929	0.000084	0.002147	0.000057
50-54 years	0.004942	0.000057	0.003492	0.000066
55-59 years	0.008765	0.000014	0.005914	0.000066
60-64 years	0.015251	0.000010	0.010523	0.000060
65-69 years	0.026098	0.000126	0.018523	0.000060
70-74 years	0.043912	0.000445	0.032223	0.000249
75-79 years	0.072022	0.000023	0.055159	0.000130
80-85 years	0.123394	0.000542	0.098976	0.000869

(B)

Age (years)	Male		Female	
	Mean	SD	Mean	SD
30-34 years	0.003087	0.000079	0.002022	0.000055
35-39 years	0.004303	0.000105	0.00242	0.000057
40-44 years	0.005447	0.000105	0.002986	0.000054
45-49 years	0.007758	0.000116	0.004379	0.000062
50-54 years	0.011313	0.000117	0.006497	0.000059
55-59 years	0.016943	0.000121	0.010937	0.000073
60-64 years	0.027204	0.000139	0.018857	0.000104
65-69 years	0.042744	0.000183	0.030552	0.000133
70-74 years	0.062332	0.000204	0.050173	0.000178
75-79 years	0.091994	0.000258	0.074639	0.000179
80-85 years	0.126591	0.000276	0.111104	0.000192

Supplemental Table 14: Relative risk changes in (A) the risk of myocardial infarction and (B) the risk of stroke for a one unit increase in each risk factor (i.e., 1 mmHg for systolic blood pressure), by age.[11]

(A)

Age (years):	30-39	40-49	50-59	60-69	70-85
SBP (mmHg)	1.07	1.06	1.05	1.03	1.02
Chol (mmol/L)	3.65	2.87	2.08	1.55	1.42
Diabetes men	2.03	2.03	2.03	2.03	2.03
Diabetes women	2.54	2.54	2.54	2.54	2.54
Smoking men	2.43	2.43	2.43	1.84	1.54
Smoking women	2.18	2.18	2.18	2.12	1.51

(B)

Age (years):	30-39	40-49	50-59	60-69	70-85
SBP (mmHg)	1.09	1.08	1.07	1.05	1.02
Chol (mmol/L)	1.48	1.42	1.35	1.25	1.09
Diabetes men	2.00	2.00	2.00	2.00	2.00
Diabetes women	2.04	2.04	2.04	2.04	2.04
Smoking men	2.43	2.43	2.43	1.84	1.54
Smoking women	2.18	2.18	2.18	2.12	1.51

Supplemental Table 15: Disability weights assigned to incident CVD events.[22]

Condition	Disability weight
MI, days 1-2	0.422, 95% CI: 0.284-0.56
MI, days 3-28	0.056, 95% CI: 0.035-0.082
Stroke, mild	0.021, 95% CI: 0.011-0.037
Stroke, moderate	0.076, 95% CI: 0.050-0.110
Stroke, moderate with cognitive involvement	0.312, 95% CI: 0.211-0.433
Stroke, severe	0.539, 95% CI: 0.363-0.705
Stroke, severe with cognitive involvement	0.567, 95% CI: 0.394-0.738

Supplemental Table 16: Distribution of incident stroke types by severity.[23,24]

Stroke type	Incident frequency, China	Incident frequency, India
Mild stroke	25.9%	14.7%
Moderate stroke	6.1%	25.8%
Moderate stroke with cognitive involvement	3.7%	18.6%
Severe stroke	15.7%	23.7%
Severe stroke with cognitive involvement	48.6%	17.2%

Supplemental Table 17: Comparison of the features of persons who would be recommended for more intensive treatment under the treat-to-target (TTT), benefit-based tailored treatment (BTT), or hybrid approach (based on current World Health Organization guidelines), utilizing current estimates of blood pressure levels, blood pressure treatment access, other risk factors, and treatment benefit for populations in China and India. Uncertainty intervals are in parentheses.*

Outcome	People not treated by any strategy	People treated identically by all three strategies	People treated most intensively by TTT	People treated most intensively by BTT	People treated most intensively by Hybrid
China					
Number of people treated (million n)	575.6 (591.3-559.9)	2.1 (1.1-3.1)	62.3 (59-65.6)	36.6 (27.8-45.4)	39.4 (36.8-42)
Age, mean	48.4 (48.2-48.6)	65.0 (64.8-65.2)	51.8 (50.2-53.4)	65.0 (63.4-66.6)	56.0 (54.4-57.6)
Women, %	52 (51.4-52.6)	35.8 (0.7-70.9)	51.2 (44.9-57.5)	14.3 (0-36.4)	63.7 (57-70.4)
Tobacco use, %	27.9 (27.6-28.2)	30.4 (17.9-42.9)	30.5 (26.9-34.1)	40.2 (32-48.4)	23.6 (20.5-26.7)
Diabetes, %	6.7 (6.6-6.8)	37.4 (32.5-42.3)	0 (0-0)	12.8 (10.2-15.4)	55.8 (50.7-60.9)
Mean initial SBP, mmHg	104.4 (103.5-105.3)	179.9 (178.1-181.7)	147.6 (146.7-148.5)	139.4 (137.5-141.3)	143.9 (141.3-146.5)
Mean final SBP, mmHg	104.4 (103.5-105.3)	166.6 (164.7-168.5)	142.7 (141.6-143.8)	130.2 (127.6-132.8)	136.7 (134.6-138.8)

Mean initial 10-y CVD risk, %	6.2 (5.9-6.5)	19.2 (15.7-22.7)	4.7 (4.1-5.3)	16.8 (15.1-18.5)	6.1 (5.6-6.6)
Percent with initial 10-y CVD risk <1%	42.4 (39-45.8)	0 (0-0)	6.4 (4.8-8)	0 (0-0)	4.3 (1.5-7.1)
Percent with initial 10-y CVD risk 1-<5%	22.6 (18.3-26.9)	0 (0-0)	55.4 (49.2-61.6)	0 (0-0)	37 (31.4-42.6)
Percent with initial 10-y CVD risk 5-<10%	12.6 (10.4-14.8)	0 (0-0)	38.1 (31.1-45.1)	0 (0-0)	47.5 (29.2-65.8)
Percent with initial 10-y CVD risk ≥10%	22.3 (22-22.6)	100 (100-100)	0.1 (0.4-0.6)	100 (100-100)	11.3 (1.5-24.1)
Mean final 10-y CVD risk, %	6.2 (5.9-6.5)	13.6 (11.1-16.1)	3.9 (3.4-4.4)	12.8 (11.6-14)	4.8 (4.4-5.2)
India					
Number of people treated (million n)	394 (414.5-373.5)	4.1 (3.2-5)	50.8 (47.8-53.8)	28.8 (13.9-43.7)	21.3 (19.6-23)
Age, mean	45.6 (45.3-45.9)	69.5 (68.1-70.9)	41 (39.8-42.2)	67.8 (65.8-69.8)	47.6 (44-51.2)
Women, %	49.8 (48.8-50.8)	48.2 (44.3-52.1)	57.2 (52.7-61.7)	46.4 (38.6-54.2)	59 (41.7-76.3)
Tobacco use, %	25.6 (24.9-26.3)	24.7 (22.5-26.9)	21.4 (18.4-24.4)	29.9 (25.4-34.4)	22.6 (14-31.2)

Diabetes, %	4.1 (4-4.2)	16.4 (15.6-17.2)	0 (0-0)	8.1 (7-9.2)	43 (38.6-47.4)
Mean initial SBP, mmHg	105.5 (105-106)	188.8 (187.5-190.1)	147.9 (147.8-148)	137.4 (136.7-138.1)	143 (142.3-143.7)
Mean final SBP, mmHg	105.5 (105-106)	177.2 (175.7-178.7)	143.5 (143.4-143.6)	129.6 (128.7-130.5)	136.9 (136.2-137.6)
Mean initial 10-y CVD risk, %	6.3 (5.9-6.6)	20.1 (13.1-27.1)	4.7 (4.2-5.2)	16.6 (10.2-23)	6.1 (4.4-7.8)
Percent with initial 10-y CVD risk <1%	40.4 (36.3-44.5)	0 (0-0)	36.3 (30.7-41.9)	0 (0-0)	13.6 (9.1-18.1)
Percent with initial 10-y CVD risk 1-<5%	29 (24.6-33.4)	0 (0-0)	42.9 (29.8-56)	0 (0-0)	47.5 (24.9-70.1)
Percent with initial 10-y CVD risk 5-<10%	11.5 (7.2-15.8)	0 (0-0)	20.2 (10.1-30.3)	0 (0-0)	33.5 (9.3-57.7)
Percent with initial 10-y CVD risk ≥10%	19.2 (16.5-21.9)	100 (100-100)	0.6 (1-2.2)	100 (100-100)	5.4 (7.9-18.7)
Mean final 10-y CVD risk, %	6.3 (5.9-6.6)	14.3 (8.8-19.8)	3.9 (3.5-4.3)	12.6 (7.2-18)	4.8 (3.4-6.2)

∗ Uncertainty intervals (in parentheses) were determined by 10,000 iterations with multivariable Monte Carlo sampling from the 95% confidence intervals of all input parameters, including the CVD risk estimation equations.

Supplemental Table 18: Characteristics of individuals prevented from a MI or stroke event under the treat-to-target (TTT), benefit-based tailored treatment (BTT), or hybrid approach (based on current World Health Organization guidelines), utilizing current estimates of utilizing current estimates of blood pressure levels, blood pressure treatment access, co-morbid conditions, and treatment benefit for populations in China and India. 95% confidence intervals are in parentheses.

Outcome	People prevented from an event by TTT	People prevented from an event by BTT	People prevented from an event by Hybrid
China			
Number of people (million n)	1.1 (1-1.2)	1.9 (1.5-2.3)	1.1 (0.9-1.3)
Age, mean	57.1 (56.9-57.3)	65 (64.9-65.1)	59.8 (59.3-60.3)
Women, %	49.3 (48.6-50)	21.6 (-2.8-46)	44.4 (39.5-49.3)
Tobacco use, %	28.9 (28-29.8)	37.3 (27.7-46.9)	29.8 (27.2-32.4)
Diabetes, %	18.2 (17.7-18.7)	16.5 (15.6-17.4)	42.4 (37.8-47)
Mean initial SBP, mmHg	153.7 (153.5-153.9)	144.6 (142.3-146.9)	151.4 (150.8-152)
Mean final SBP, mmHg	138.7 (138.5-138.9)	121.6 (118.2-125)	130.6 (130.1-131.1)
Mean initial 10-y CVD risk, %	9.1 (8.2-10)	16.7 (14.8-18.6)	11.4 (9.6-13.2)
Mean final 10-y CVD risk, %	4.9 (4.5-5.3)	6.8 (6.3-7.3)	5.1 (4-6.2)
India			

Number of people (million n)	0.7 (0.6-0.8)	1.6 (1.3-1.9)	0.9 (0.7-1.1)
Age, mean	57.4 (57.2-57.6)	68.3 (67-69.6)	66.0 (65.8-66.2)
Women, %	54.5 (53.7-55.3)	47.4 (42.6-52.2)	51.1 (49.6-52.6)
Tobacco use, %	24.6 (24.2-25)	28.2 (25.4-31)	25.1 (24.2-26)
Diabetes, %	9.2 (8.8-9.6)	9.6 (8.6-10.6)	14.1 (13.4-14.8)
Mean initial SBP, mmHg	161.1 (160.8-161.4)	147.6 (146-149.2)	158.8 (158.4-159.2)
Mean final SBP, mmHg	142.3 (142.1-142.5)	122.7 (120.9-124.5)	135.0 (134.4-135.6)
Mean initial 10-y CVD risk, %	9.5 (7.2-11.8)	17.0 (11.4-22.6)	12.0 (8.5-15.5)
Mean final 10-y CVD risk, %	5.0 (3.8-6.2)	6.9 (4.2-9.6)	5.3 (3.4-7.2)

Supplemental Table 19: Example patients and their differential treatment under PEN, TTT and BTT approaches. All patients have a total cholesterol = 5 mmol/L, HDL = 1.4 mmol/L, and none have a history of CVD.

Example patient	CVD risk (% probability of event over 10 years)	Is medication recommended by:		
		TTT	BTT	Hybrid
45yo woman, nonsmoker, nondiabetic, SBP 138	3.4%	N	N	N
45yo woman, nonsmoker, diabetic, SBP 144	8.7%	Y	N	Y
55yo woman, nonsmoker, nondiabetic, SBP 154	7.4%	Y	N	N
55yo man, smoker, nondiabetic, SBP 144	18.7%	Y	Y	N
55yo man, smoker, nondiabetic, SBP 138	17.2%	N	Y	N
55yo man, smoker, diabetic, SBP 138	23.5%	N	Y	Y

Supplemental Table 20: Sensitivity analysis in which the total risk threshold for BTT therapy is shifted from 10% to 5% for adults <60 years old. Compare to baseline estimates in main text Table 2.

Outcome	China (N=716 million)			India (N=499 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	15.1 (14.9-15.3)	31.8 (27.8-35.8)	13.8 (13-14.6)	22.2 (22-22.4)	27.7 (23.2-32.2)	15.4 (14.6-16.2)
per person treated	1.8 (1.8-1.8)	2.7 (2.6-2.8)	2.5 (2.4-2.6)	2.2 (2.2-2.2)	3.0 (3.0-3.0)	2.9 (2.9-2.9)
Adults who receive treatment, %, n millions:						
Total	9% (8.8%-9.2%), 64.4	11.9% (9.9%-13.9%), 85.2	5.8% (5.2%-6.4%), 41.5	11% (10.8%-11.2%), 54.9	9.7% (7.6%-11.8%), 48.4	5.1% (4.6%-5.6%), 25.4
1 medication	5% (4.9%-5.1%), 35.9	0.5% (-0.2%-1.2%), 3.9	1.9% (1.6%-2.2%), 13.4	4.9% (4.8%-5%), 24.6	0.4% (0%-0.8%), 1.9	0.9% (0.7%-1.1%), 4.5

2 medications	2.4% (2.3%-2.5%), 16.9	6% (5.4%-6.6%), 42.8	1.3% (1.1%-1.5%), 9.5	2.9% (2.8%-3%), 14.6	4.2% (3.4%-5%), 21	0.7% (0.6%-0.8%), 3.6
3 medications	0.9% (0.9%-0.9%), 6.4	2.1% (1.9%-2.3%), 14.8	1.1% (1%-1.2%), 8.2	1.4% (1.4%-1.4%), 7.1	1.5% (1.2%-1.8%), 7.4	1.1% (1%-1.2%), 5.7
4 medications	0.7% (0.7%-0.7%), 4.8	3.3% (2.8%-3.8%), 23.5	1.5% (1.5%-1.5%), 10.5	1.8% (1.8%-1.8%), 8.9	3.6% (3%-4.2%), 18	2.4% (2.3%-2.5%), 12.1
Initial SBP among treated, in mmHg	153.7 (153.6-153.8)	141.5 (140.1-142.9)	151.4 (150.8-152)	160.3 (160.2-160.4)	147.3 (146.6-148)	158.8 (158.5-159.1)
Final SBP among treated, in mmHg	146.2 (146-146.4)	130.3 (128.5-132.1)	141 (140.5-141.5)	151.1 (150.9-151.3)	134.8 (134-135.6)	146.9 (146.5-147.3)

Pre-treatment 10-year CVD risk among treated, mean %	9.1 (8.2-10)	12.7 (11.8-13.6)	11.5 (9.6-13.4)	13.2 (11.1-15.3)	17.8 (15.0-20.6)	15.8 (12.4-19.2)
Post-treatment 10-year CVD risk among treated, mean %	7.1 (6.4-7.8)	9 (8.5-9.5)	8.3 (6.8-9.8)	10.1 (8.5-11.7)	12.9 (10.9-14.9)	11.8 (9.2-14.4)
MI and stroke events prevented per 10 years:						
Total, millions	1.1 (1-1.2)	2.9 (2.3-3.5)	1.1 (0.9-1.3)	0.8 (0.7-0.9)	2 (1.7-2.3)	0.9 (0.7-1.1)
MI, millions	0.3 (0.3-0.3)	0.8 (0.7-0.9)	0.3 (0.2-0.4)	0.5 (0.5-0.6)	1.2 (1-1.4)	0.5 (0.4-0.6)

Stroke, millions	0.8 (0.7-0.9)	2.1 (1.6-2.6)	0.8 (0.6-1)	0.3 (0.3-0.3)	0.8 (0.6-1)	0.3 (0.2-0.4)
Number needed to treat to prevent one event	58.5 (52.5-65.9)	29.4 (20.3-43.3)	37.7 (28.6-50.9)	68.6 (59.9-79.9)	24.2 (16.5-34.6)	28.2 (20.9-39.9)
Total costs, million $US 2015	$3575 (2928-4280)	$7,886 ($6,306-$9,892)	$3519 (2612-4557)	$2595 (2149-3076)	$3,583 (3,180-4,228)	$2228 (1711-2817)
Total DALYs averted, millions	8.2 (7.5-8.9)	19.4 (15.3-23.5)	8.1 (6.6-9.6)	6.5 (6.1-6.9)	12.9 (10.7-15.1)	6.2 (5.2-7.2)
$/DALY averted	$435.9 (390.4-480.8)	$406.4 (391.9-420.9)	$434.4 (395.7-474.6)	$399.2 (352.2-445.7)	$277.7 (275.4-280.0)	$359.3 (329.0-391.2)

MI and stroke deaths averted, %, n thousands	4% (3.7%-4.4%), 392	10.6% (8.5%-12.7%), 1048.6	4% (2.9%-5.1%), 399	3.3% (3.2%-3.6%), 325	8% (6.4%-9.5%), 788	3.3% (2.4%-4%), 329

Supplemental Table 21: Sensitivity analysis in which the treatment threshold for TTT therapy is shifted to a systolic blood pressure of 120mmHg. For fair comparison, we also lowered the BTT risk threshold for treatment to match the same budget as the lower TTT scenario, which occurs at a risk threshold of 3.1% in China and 2.4% in India. Compare to baseline estimates in main text Table 2.

Outcome	China (N=716 million)			India (N=499 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	82.5 (81.9-83.1)	51.3 (42.7-59.9)	13.8 (13-14.6)	78.5 (78-79)	67.5 (60.5-74.5)	15.4 (14.6-16.2)
per person treated	2.4 (2.4-2.4)	2.9 (2.9-2.9)	2.5 (2.4-2.6)	2.6 (2.6-2.6)	3.9 (3.9-3.9)	2.9 (2.9-2.9)
Adults who receive treatment, %, n millions:						
Total	39% (38.4%-39.6%), 279.2	19.3% (14.8%-23.8%), 138.2	5.8% (5.2%-6.4%), 41.5	32.4% (31.8%-33%), 161.7	17.7% (15.6%-19.8%), 88.3	5.1% (4.6%-5.6%), 25.4

1 medication	15.5% (15.3%-15.7%), 111.3	1.3% (0.1%-2.5%), 9.3	1.9% (1.6%-2.2%), 13.4	9.9% (9.7%-10.1%), 52.1	0.8% (0.6%-1%), 4.4	0.9% (0.7%-1.1%), 4.5
2 medications	10.9% (10.7%-11.1%), 78.098	9.3% (7.3%-11.3%), 66.3	1.3% (1.1%-1.5%), 9.5	8.1% (7.9%-8.3%), 42.581	0.4% (0.3%-0.5%), 2.0	0.7% (0.6%-0.8%), 3.6
3 medications	5.6% (5.5%-5.7%), 40.4	3.3% (2.8%-3.8%), 23.4	1.1% (1%-1.2%), 8.2	5% (4.9%-5.1%), 26.4	0.1% (0.1%-0.1%), 0.7	1.1% (1%-1.2%), 5.7
4 medications	7% (6.9%-7.1%), 50.4	5.4% (4.6%-6.2%), 38.7	1.5% (1.5%-1.5%), 10.5	9.4% (9.3%-9.5%), 49.6	16.4% (14.6%-18.2%), 86.6	2.4% (2.3%-2.5%), 12.1
Initial SBP among treated, in mmHg	138.6 (138.5-138.7)	142.1 (141.2-143)	151.4 (150.8-152)	141.9 (141.8-142)	146.3 (145.8-146.8)	158.8 (158.5-159.1)
Final SBP among	128.5 (128.4-128.6)	130.1 (129.2-131)	141 (140.5-141.5)	131.2 (131.1-131.3)	130.4 (129.9-130.9)	146.9 (146.5-147.3)

treated, in mmHg						
Pre-treatment 10-year CVD risk among treated, mean %	7.2 (6.7-7.6)	10.1 (8.9-11.3)	11.5 (9.6-13.4)	10.4 (9.1-11.7)	14.9 (12.1-17.7)	15.8 (12.4-19.2)
Post-treatment 10-year CVD risk among treated, mean %	5.4 (5-5.8)	7 (6.2-7.9)	8.3 (6.8-9.8)	7.7 (6.7-8.7)	10.2 (8.2-12.2)	11.8 (9.2-14.4)

MI and stroke events prevented per 10 years:						
Total, millions	4.0 (3.8-4.2)	3.9 (3.5-4.1)	1.1 (0.9-1.3)	4.4 (4.1-4.7)	5.3 (5.1-5.5)	0.9 (0.7-1.1)
MI, millions	1.1 (1-1.2)	1.1 (1-1.2)	0.3 (0.2-0.4)	2.5 (2.3-2.7)	3.1 (2.8-3.4)	0.5 (0.4-0.6)
Stroke, millions	2.9 (2.7-3.1)	2.8 (2.6-3)	0.8 (0.6-1)	1.9 (1.8-2)	2.2 (2-2.4)	0.3 (0.2-0.4)
Number needed to treat to prevent one event	69.8 (65.5-74.6)	35.4 (25.9-48.7)	37.7 (28.6-50.9)	36.8 (33.8-40.2)	16.7 (14.1-19.4)	28.2 (20.9-39.9)
Total costs, million $US 2015	$12,627 (8,740-17,216)	$12,623 (10,498-17,514)	$3519 (2612-4557)	$9064 (6366-12207)	$9086 (8452-9070)	$2228 (1711-2817)

Total DALYs averted, millions	23.3 (19.3-27.5)	27.2 (24.9-29.5)	8.1 (6.6-9.6)	18.5 (15.7-21.3)	18.7 (16.2-21.2)	6.2 (5.2-7.2)
$/DALY averted	$541.9 (452.8-626.0)	$464.0 (334.4-593.6)	$434.4 (395.7-474.6)	$489.9 (405.4-573.0)	$485.8 (427.8-543.8)	$359.3 (329.0-391.2)
MI and stroke deaths averted, %, n thousands	14.6% (13.5%-15.7%), 1446	14.3% (13.2%-15.4%), 1412.6	4% (2.9%-5.1%), 399.1	17.4% (16.2%-18.6%), 1719.6	21% (19%-23%), 2080	3.3% (2.4%-4%), 329.4

Supplemental Table 22: Sensitivity analysis in which the total risk threshold for BTT therapy is shifted from 10% to 15%. Compare to baseline estimates in main text Table 2.

Outcome	China (N=716 million)			India (N=499 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	15.1 (14.9-15.3)	10.8 (7-14.6)	13.8 (13-14.6)	22.2 (22-22.4)	8.8 (7.2-10.4)	15.4 (14.6-16.2)
per person treated	1.8 (1.8-1.8)	2.7 (2.3-3.1)	2.5 (2.4-2.6)	2.2 (2.2-2.2)	3 (3-3)	2.9 (2.9-2.9)
Adults who receive treatment, %, n millions:						
Total	9% (8.8%-9.2%), 64.4	3.9% (1.6%-6.2%), 27.9	5.8% (5.2%-6.4%), 41.5	11% (10.8%-11.2%), 54.9	3.2% (2.5%-3.9%), 16	5.1% (4.6%-5.6%), 25.4
1 medicatio	5% (4.9%-5.1%), 35.9	0.4% (-0.3%-1.1%), 3.1	1.9% (1.6%-2.2%), 13.4	4.9% (4.8%-5%), 24.6	0.3% (0.1%-0.5%), 1.4	0.9% (0.7%-1.1%), 4.5

n						
2 medications	2.4% (2.3%-2.5%), 16.9	1.4% (0.6%-2.2%), 10.3	1.3% (1.1%-1.5%), 9.5	2.9% (2.8%-3%), 14.6	1.3% (1.1%-1.5%), 6.3	0.7% (0.6%-0.8%), 3.6
3 medications	0.9% (0.9%-0.9%), 6.4	0.7% (0.5%-0.9%), 4.9	1.1% (1%-1.2%), 8.2	1.4% (1.4%-1.4%), 7.1	0.5% (0.4%-0.6%), 2.4	1.1% (1%-1.2%), 5.7
4 medications	0.7% (0.7%-0.7%), 4.8	1.4% (0.8%-2%), 9.8	1.5% (1.5%-1.5%), 10.5	1.8% (1.8%-1.8%), 8.9	1.1% (0.9%-1.3%), 5.7	2.4% (2.3%-2.5%), 12.1
Initial SBP among treated, in mmHg	153.7 (153.6-153.8)	143 (139-147)	151.4 (150.8-152)	160.3 (160.2-160.4)	149.5 (148.4-150.6)	158.8 (158.5-159.1)
Final SBP among treated, in mmHg	146.2 (146-146.4)	131.6 (126.2-137)	141 (140.5-141.5)	151.1 (150.9-151.3)	137.1 (135.9-138.3)	146.9 (146.5-147.3)

Pre-treatment 10-year CVD risk among treated, mean %	9.1 (8.2-10)	18.5 (16.5-20.5)	11.5 (9.6-13.4)	13.2 (11.1-15.3)	26 (19.5-32.5)	15.8 (12.4-19.2)
Post-treatment 10-year CVD risk among treated, mean %	7.1 (6.4-7.8)	13.1 (12.1-14.1)	8.3 (6.8-9.8)	10.1 (8.5-11.7)	19.0 (14.3-23.7)	11.8 (9.2-14.4)
MI and stroke events prevented per 10 years:						
Total, millions	1.1 (1-1.2)	1.5 (0.9-2.1)	1.1 (0.9-1.3)	0.8 (0.7-0.9)	1 (0.8-1.2)	0.9 (0.7-1.1)
MI, millions	0.3 (0.3-0.3)	0.4 (0.2-0.6)	0.3 (0.2-0.4)	0.5 (0.4-0.6)	0.6 (0.5-0.7)	0.5 (0.4-0.6)
Stroke, millions	0.8 (0.7-0.9)	1.1 (0.7-1.5)	0.8 (0.6-1)	0.3 (0.3-0.3)	0.4 (0.3-0.5)	0.3 (0.2-0.4)

Number needed to treat to prevent one event	58.5 (52.5-65.9)	18.6 (5.5-49.3)	37.7 (28.6-50.9)	68.6 (59.9-79.9)	16 (10.4-24.4)	28.2 (20.9-39.9)
Total costs, million $US 2015	$3575 (2928-4280)	$3367 (1609-5707)	$3519 (2612-4557)	$2595 (2149-3076)	$1788 (1269-2401)	$2228 (1711-2817)
Total DALYs averted, millions	8.2 (7.5-8.9)	10.6 (6.4-14.8)	8.1 (6.6-9.6)	6.5 (6.1-6.9)	6.6 (5.3-7.9)	6.2 (5.2-7.2)
$/DALY averted	$435.9 (390.4-480.8)	$317.6 (249.6-385.6)	$434.4 (395.7-474.6)	$399.2 (352.2-445.7)	$270.9 (237.9-303.9)	$359.3 (329.0-391.2)
MI and stroke deaths averted, %, n	4.0% (3.7%-4.4%), 392.0	5.5% (3.2%-7.7%), 541.0	4% (2.9%-5.1%), 399.0	3.2% (2.8%-3.6%), 325.0	4.0% (3.2%-4.8%), 394.0	3.3% (2.4%-4%), 329.0

thousands						

Supplemental Table 23: Sensitivity analysis in which access to blood pressure treatment is increased by 5 percentage points above baseline values listed in Table 1. Compare to baseline estimates in Supplemental Table 1.

Outcome	China (N=716 million)			India (N=499 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	16 (15.7-16.3)	16.3 (12-20.6)	14.5 (14-15)	23.8 (23.4-24.2)	20.6 (16.5-24.7)	16.6 (16.1-17.1)
per person treated	1.8 (1.8-1.8)	2.7 (2.7-2.7)	2.5 (2.4-2.6)	2.2 (2.2-2.2)	3 (2.9-3.1)	2.9 (2.9-2.9)
Adults who receive treatment, %, n millions:						
Total	9.4% (9.1%-9.7%), 67.3	5.9% (4.3%-7.5%), 42.2	6% (5.5%-6.5%), 43.0	11.9% (11.5%-12.3%), 59.4	7.2% (4.9%-9.5%), 35.9	5.6% (5.2%-6%), 27.9
1 medication	5.3% (5.1%-5.5%), 37.8	0.6% (0.3%-0.9%), 4.2	1.9% (1.7%-2.1%), 13.9	5.3% (5.2%-5.4%), 26.5	0.4% (-0.3%-1.1%), 1.9	1% (0.9%-1.1%), 5.2

2 medications	2.5% (2.4%-2.6%), 18	2.4% (2%-2.8%), 17.5	1.4% (1.2%-1.6%), 9.9	3.2% (3.1%-3.3%), 15.8	2.9% (2%-3.8%), 14.5	0.8% (0.7%-0.9%), 3.9
3 medications	0.9% (0.9%-0.9%), 6.8	1% (0.7%-1.3%), 7.3	1.2% (1.2%-1.2%), 8.7	1.5% (1.4%-1.6%), 7.5	1.1% (0.9%-1.3%), 5.4	1.2% (1.1%-1.3%), 6.2
4 medications	0.7% (0.7%-0.7%), 5.1	1.9% (1.3%-2.5%), 13.9	1.5% (1.4%-1.6%), 11	1.9% (1.8%-2%), 9.6	2.8% (2.3%-3.3%), 14	2.6% (2.5%-2.7%), 12.9
Initial SBP among treated, in mmHg	153.7 (153.5-153.9)	145.4 (143.9-146.9)	151.4 (150.9-151.9)	160.4 (160.3-160.5)	147.3 (146.4-148.2)	158.8 (158.5-159.1)
Final SBP among treated, in mmHg	146.2 (146-146.4)	134.1 (132.5-135.7)	141 (140.7-141.3)	151.1 (151-151.2)	134.8 (133.8-135.8)	146.9 (146.5-147.3)

Pre-treatment 10-year CVD risk among treated, mean %	9.2 (8.9-9.5)	16.3 (14.8-17.8)	11.5 (10.4-12.6)	12.9 (10.9-14.9)	20.3 (16.8-23.8)	15.4 (12.1-18.7)
Post-treatment 10-year CVD risk among treated, mean %	7.1 (6.8-7.4)	11.6 (10.6-12.6)	8.3 (7.4-9.2)	9.9 (8.4-11.4)	14.7 (12.2-17.2)	11.5 (9.1-13.9)
MI and stroke events prevented per 10 years:						
Total, millions	1.1 (1-1.2)	2 (1.6-2.4)	1.2 (1.1-1.3)	0.9 (0.8-1)	1.9 (1.5-2.3)	1 (0.9-1.1)
MI, millions	0.3 (0.3-0.3)	0.6 (0.5-0.7)	0.33 (0.3-0.4)	0.6 (0.5-0.7)	1.1 (0.8-1.4)	0.6 (0.5-0.7)

Stroke, millions	0.8 (0.7-0.9)	1.5 (1.2-1.8)	0.8 (0.7-0.9)	0.4 (0.4-0.4)	0.7 (0.6-0.8)	0.4 (0.3-0.5)
Number needed to treat to prevent one event	61.2 (54.3-69.5)	21.1 (12.8-33.6)	35.8 (30.3-42.3)	66 (57.4-76.8)	18.9 (10.7-31.6)	27.9 (23.5-33.2)
Total costs, million $US 2015	$3695 (3067-4371)	$3758 (2642-5092)	$3561 (2394-4315)	$2722 (2333-3137)	$2646 (1805-3672)	$2359 (1879-2906)
Total DALYs averted, millions	8.7 (8.2-9.2)	14.2 (11.4-17)	8.6 (7.6-9.6)	7.1 (6.6-7.6)	12.8 (10.1-15.5)	6.8 (6.1-7.5)
$/DALY averted	$424.7 (374.0-475.1)	$264.6 (229.7-299.5)	$414.0 (380.7-449.4)	$383.3 (353.4-412.7)	$206.7 (176.5-236.9)	$346.9 (308.0-387.4)

MI and stroke deaths averted, %, n thousands	4.1% (3.7%-4.4%), 401.7	7.6% (6.2%-9.1%), 752.7	4.1% (3.7%-4.8%), 410.4	4.0% (3.5%-4.4%), 394.0	7.2% (5.5%-8.8%), 711.2	4.0% (3.2%-4.8%), 394.0

Supplemental Table 24: Sensitivity analysis in which adherence to blood pressure treatment is increased by 5 percentage points above the baseline value of 50%. Compare to baseline estimates in main text Table 2.

Outcome	China (N=716 million)			India (N=499 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	14.4 (14.2-14.6)	14.1 (9.6-18.6)	13.1 (12.4-13.8)	14.4 (14.1-14.7)	14.1 (9.9-18.3)	13.1 (12.3-13.9)
per person treated	1.7 (1.7-1.7)	2.6 (2.5-2.7)	2.4 (2.3-2.5)	1.7 (1.7-1.7)	2.6 (2.5-2.7)	2.4 (2.3-2.5)
Adults who receive treatment, %, n millions:						
Total	8.5% (8.3%-8.7%), 60.9	5.1% (3.2%-7%), 36.5	5.6% (5%-6.2%), 40.1	8.5% (8.2%-8.8%), 42.4	5.1% (2.8%-7.4%), 25.4	5.6% (5%-6.2%), 27.9
1 medicati	4.8% (4.7%-4.9%), 34.1	0.4% (-0.1%-0.9%), 3.1	1.8% (1.5%-2.1%), 12.7	4.8% (4.7%-4.9%), 34.1	0.4% (-0.2%-1%), 3.1	1.8% (1.6%-2%), 12.7

on						
2 medications	2.2% (2.1%-2.3%), 16.1	2.1% (1.6%-2.6%), 15.1	1.3% (1.1%-1.5%), 9	2.2% (2.1%-2.3%), 16.1	2.1% (1.2%-3%), 15.1	1.3% (1.2%-1.4%), 9
3 medications	0.9% (0.9%-0.9%), 6.1	0.9% (0.6%-1.2%), 6.2	1.1% (1%-1.2%), 7.8	0.9% (0.9%-0.9%), 6.1	0.9% (0.6%-1.2%), 6.2	1.1% (1%-1.2%), 7.8
4 medications	0.6% (0.6%-0.6%), 4.6	1.7% (1.1%-2.3%), 12.2	1.4% (1.4%-1.4%), 9.9	0.6% (0.5%-0.7%), 4.6	1.7% (1.2%-2.2%), 12.2	1.4% (1.2%-1.6%), 9.9
Initial SBP among treated, in mmHg	153.7 (153.6-153.8)	144.6 (142.3-146.9)	151.4 (150.8-152)	160.3 (160.2-160.4)	147.6 (146-149.2)	158.8 (158.5-159.1)
Final SBP among treated, in mmHg	146.2 (146-146.4)	133.2 (130.3-136.1)	141 (140.5-141.5)	151.1 (150.9-151.3)	135.1 (133.4-136.8)	146.9 (146.5-147.3)

Pre-treatment 10-year CVD risk among treated, mean %	9.1 (8.2-10)	16.7 (14.8-18.6)	11.5 (9.6-13.4)	13.2 (11.1-15.3)	21.2 (15.7-26.7)	15.8 (12.4-19.2)
Post-treatment 10-year CVD risk among treated, mean %	6.7 (6.2-7.2)	11.2 (9.8-12.6)	7.9 (6.7-9.1)	9.7 (7.6-11.8)	14.1 (11.0-17.2)	11.1 (7.5-14.7)
MI and stroke events prevented per 10 years:						
Total, millions	1.2 (1.1-1.3)	2.2 (1.8-2.6)	1.3 (1.1-1.5)	1 (0.9-1.1)	2 (1.6-2.4)	1 (0.8-1.2)
MI, millions	0.3 (0.3-0.3)	0.6 (0.5-0.7)	0.4 (0.3-0.5)	0.6 (0.5-0.7)	1.2 (0.9-1.5)	0.6 (0.4-0.8)
Stroke, millions	0.9 (0.8-1)	1.6 (1.2-2)	1 (0.8-1.2)	0.4 (0.4-0.4)	0.8 (0.6-1)	0.4 (0.3-0.5)

Number needed to treat to prevent one event	50.8 (45.7-56.6)	16.6 (8.8-27.8)	30.8 (23.9-40.4)	42.4 (37.2-48.8)	12.7 (5.8-23.1)	27.9 (20.8-38.6)
Total costs, million $US 2015	$3899 (3276-4571)	$4159 (2915-5646)	$3966 (3040-5026)	$2810 (2312-3353)	$2737 (1861-3794)	$2456 (1786-3231)
Total DALYs averted, millions	9.3 (8.7-9.9)	15.4 (12.3-18.5)	9.7 (8.2-11.2)	7.4 (6.8-8)	13.7 (10.6-16.8)	7.3 (5.9-8.7)
$/DALY averted	$419.2 (376.5-461.7)	$270.0 (234.9-305.1)	$404.6 (370.7-448.7)	$379.7 (340.0-419.1)	$199.7 (173.6-225.8)	$336.4 (302.7-371.3)
MI and stroke deaths averted, %, n	4.4% (4%-4.7%), 431.0	8.0% (6.2%-9.8%), 795.0	5.1% (4%-6.2%), 508.0	4.0% (3.5%-4.4%), 394.0	8.0% (6%-10%), 788.0	4.0% (2.8%-5.2%), 394.0

thousands						

Supplemental Table 25: Sensitivity analysis in which a "safety valve" strategy of treating everyone with systolic BP>150mmHg was incorporated into the BTT strategy. Compare to baseline estimates in main text Table 2.

Outcome	China (N=716 million)			India (N=499 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	15.1 (14.9-15.3)	22.6 (19.1-26.1)	13.8 (13-14.6)	22.2 (22-22.4)	28.3 (22.7-33.9)	15.4 (14.6-16.2)
per person treated	1.8 (1.8-1.8)	3.8 (3.7-3.9)	2.5 (2.4-2.6)	2.2 (2.2-2.2)	3.7 (3.7-3.7)	2.9 (2.9-2.9)
Adults who receive treatment, %, n millions:						
Total	9% (8.8%-9.2%), 64.4	6.7% (4.9%-8.5%), 48.0	5.8% (5.2%-6.4%), 41.5	11% (10.8%-11.2%), 54.9	8.8% (7.2%-10.4%), 43.9	5.1% (4.6%-5.6%), 25.4
1 medicati	5% (4.9%-5.1%), 35.9	1.1% (0.7%-1.5%), 7.6	1.9% (1.6%-2.2%), 13.4	4.9% (4.8%-5%), 24.6	1.1% (0.9%-1.3%), 5.7	0.9% (0.7%-1.1%), 4.5

on						
2 medications	2.4% (2.3%-2.5%), 16.9	0.4% (0.2%-0.6%), 2.8	1.3% (1.1%-1.5%), 9.5	2.9% (2.8%-3%), 14.6	0.5% (0.5%-0.5%), 2.3	0.7% (0.6%-0.8%), 3.6
3 medications	0.9% (0.9%-0.9%), 6.4	0.1% (0%-0.2%), 0.8	1.1% (1%-1.2%), 8.2	1.4% (1.4%-1.4%), 7.1	0.1% (0.1%-0.1%), 0.6	1.1% (1%-1.2%), 5.7
4 medications	0.7% (0.7%-0.7%), 4.8	5.1% (4%-6.2%), 36.5	1.5% (1.5%-1.5%), 10.5	1.8% (1.8%-1.8%), 8.9	7.1% (5.7%-8.5%), 35.1	2.4% (2.3%-2.5%), 12.1
Initial SBP among treated, in mmHg	153.7 (153.6-153.8)	146.3 (146.1-146.5)	151.4 (150.8-152)	160.3 (160.2-160.4)	149.3 (147.9-150.7)	158.8 (158.5-159.1)
Final SBP among treated, in mmHg	146.2 (146-146.4)	130.7 (130.2-131.2)	141 (140.5-141.5)	151.1 (150.9-151.3)	132.6 (131.1-134.1)	146.9 (146.5-147.3)

Pre-treatment 10-year CVD risk among treated, mean %	9.1 (8.2-10)	14.4 (10.6-18.2)	11.5 (9.6-13.4)	13.2 (11.1-15.3)	18.3 (14.4-22.2)	15.8 (12.4-19.2)
Post-treatment 10-year CVD risk among treated, mean %	7.1 (6.4-7.8)	9.6 (7-12.2)	8.3 (6.8-9.8)	10.1 (8.5-11.7)	12.5 (9.8-15.2)	11.8 (9.2-14.4)
MI and stroke events prevented per 10 years:						
Total, millions	1.1 (1-1.2)	2.3 (2.2-2.4)	1.1 (0.9-1.3)	0.8 (0.7-0.9)	1.9 (1.6-2.2)	0.9 (0.7-1.1)
MI, millions	0.3 (0.3-0.3)	0.7 (0.6-0.8)	0.3 (0.2-0.4)	0.5 (0.4-0.6)	1.3 (1-1.6)	0.5 (0.4-0.6)

Stroke, millions	0.8 (0.7-0.9)	1.7 (1.6-1.8)	0.8 (0.6-1)	0.3 (0.3-0.3)	0.7 (0.5-0.9)	0.3 (0.2-0.4)
Number needed to treat to prevent one event	58.5 (52.5-65.9)	20.9 (14.6-27.7)	37.7 (28.6-50.9)	68.6 (59.9-79.9)	23.1 (16.3-32.4)	28.2 (20.9-39.9)
Total costs, million $US 2015	$3575 (2928-4280)	$4114 (3486-4850)	$3519 (2612-4557)	$2595 (2149-3076)	$2713 (1320-4542)	$2228 (1711-2817)
Total DALYs averted, millions	8.2 (7.5-8.9)	16.4 (15.5-17.3)	8.1 (6.6-9.6)	6.5 (6.1-6.9)	14.2 (11.7-16.7)	6.2 (5.2-7.2)
$/DALY averted	$435.9 (390.4-480.8)	$250.8 (221.3-280.8)	$434.4 (395.7-474.6)	$399.2 (352.2-445.7)	$191.0 (110.1-271.9)	$359.3 (329.0-391.2)

MI and stroke deaths averted, %, n thousands	4.0% (3.7%-4.4%), 397.0	8.7% (8%-9.6%), 857.0	4.0% (2.9%-5.1%), 399.0	3.2% (2.8%-3.6%), 317.0	8.1% (6.1%-10.1%), 798.0	3.2% (2.4%-4%), 329.4

Supplemental Table 26: Sensitivity analysis in which the age range for analysis was increased from 30 to 70 years old to 30 to 85 years old. Compare to baseline estimates in main text Table 2.

Outcome	China (N=785 million)			India (N=528 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	18.3 (18-18.6)	31.2 (29-33.4)	24.4 (23.7-25.1)	23.1 (22.8-23.4)	24.2 (20.1-28.3)	19.3 (18.4-20.2)
per person treated	1.9 (1.9-1.9)	2.9 (2.9-2.9)	2.6 (2.5-2.7)	2.2 (2.2-2.2)	3 (3-3)	2.9 (2.9-2.9)
Adults who receive treatment, %, n millions:						
Total	10.2% (10.1%-10.3%), 80.1	10.7% (9.7%-11.7%), 84.0	9.8% (9.1%-10.5%), 76.9	11.4% (11.1%-11.7%), 60.2	8.3% (6.1%-10.5%), 43.8	6.7% (6.2%-7.2%), 35.4
1 medication	5.4% (5.3%-5.5%), 42.4	0.5% (0.2%-0.8%), 3.8	2.8% (2.6%-3%), 22.2	4.9% (4.8%-5%), 26.1	0.4% (-0.1%-0.9%), 2.3	1.3% (1.2%-1.4%), 6.9
2	2.7% (2.7%-2.7%),	4.2% (4%-4.4%),	2.4% (2.1%-2.7%),	3% (2.9%-	3.3% (2.3%-4.3%),	1.1% (0.9%-

medications	21.5	32.8	18.6	3.1%), 15.6	17.3	1.3%), 5.6
3 medications	1.1% (1.1%-1.1%), 8.9	1.8% (1.6%-2%), 14.1	1.8% (1.7%-1.9%), 14.4	1.5% (1.4%-1.6%), 7.7	1.2% (1%-1.4%), 6.5	1.3% (1.2%-1.4%), 7
4 medications	1% (1%-1%), 7.9	4.2% (3.9%-4.5%), 33.3	2.8% (2.7%-2.9%), 22.2	2% (2%-2%), 10.5	3.4% (2.9%-3.9%), 17.8	3% (2.9%-3.1%), 15.7
Initial SBP among treated, in mmHg	156.8 (156.7-156.9)	145.4 (144.9-145.9)	150.8 (150.6-151)	160.4 (160.3-160.5)	147.7 (146.3-149.1)	158.7 (158.2-159.2)
Final SBP among treated, in mmHg	148.7 (148.6-148.8)	133.2 (132.6-133.8)	140.1 (139.9-140.3)	151.1 (151-151.2)	135.3 (133.8-136.8)	146.9 (146.3-147.5)

Pre-treatment 10-year CVD risk among treated, mean %	28.6 (26.4-30.8)	41.1 (37.1-45.1)	40.4 (36.4-44.4)	13.2 (10.6-15.8)	21.0 (16.2-25.8)	15.6 (11.8-19.4)
Post-treatment 10-year CVD risk among treated, mean %	22.5 (20.7-24.3)	29.7 (26.8-32.6)	30.5 (27.5-33.5)	10.1 (8.1-12.1)	15.3 (11.7-18.9)	11.7 (8.9-14.5)
MI and stroke events prevented per 10 years:						
Total, millions	3.3 (3.1-3.5)	8.8 (8.1-9.5)	6.1 (5.6-6.6)	1.7 (1.5-1.9)	3.7 (3.2-4.2)	2.4 (2.1-2.7)

MI, millions	1.0 (0.8-1.2)	2.6 (2.1-3.1)	1.8 (1.5-2.1)	1.0 (0.9-1.1)	2.1 (1.8-2.4)	1.3 (1.1-1.5)
Stroke, millions	2.4 (2.2-2.6)	6.2 (5.7-6.7)	4.3 (3.9-4.7)	0.7 (0.6-0.8)	1.7 (1.4-2)	1.1 (0.9-1.3)
Number needed to treat to prevent one event	24.3 (22.7-26.1)	9.5 (8-11.3)	12.6 (10.8-14.7)	35.4 (30.8-41.2)	11.8 (7.7-17.3)	14.8 (12.1-18.1)
Total costs, million $US 2015	$14258 (11938-16759)	$15360 (11102-20325)	$15037 (10215-20805)	$5256 (4051-6613)	$5532 (3004-8821)	$4995 (3071-7373)
Total DALYs averted, millions	8.3 (7.8-8.8)	13.6 (11.9-15.3)	8.6 (7.2-10.0)	6.6 (5.8-7.4)	11.4 (7.9-14.9)	6.3 (4.7-7.9)
$/DALY averted	$1717.8 (1530.5-1904.4)	$1129.4 (932.9-1328.4)	$1748.4 (1418.7-2080.5)	$796.4 (698.4-893.6)	$485.3 (380.3-592.0)	$792.9 (653.4-933.3)

MI and stroke deaths averted, %, n thousands	12.5% (10.9%-14%), 1235.6	32.3% (28.5%-36.2%), 3199.2	22.4% (19.7%-25.1%), 2217.4	6.7% (6%-7.5%), 667.8	14.9% (12.6%-17.3%), 1479.2	9.4% (7.9%-11%), 931.6

Supplemental Table 27: Sensitivity analysis in which access to statin treatment is available. Compare to baseline estimates in main text Table 2.

Outcome	China (N=716 million)			India (N=499 million)		
	TTT	BTT	Hybrid	TTT	BTT	Hybrid
Medications used:						
per 100 persons age 30-85	15.1 (14.9-15.3)	14.8 (11.2-18.4)	13.8 (13-14.6)	22.2 (22-22.4)	18.5 (13.8-23.2)	15.4 (14.6-16.2)
per person treated	1.8 (1.8-1.8)	2.8 (2.7-2.9)	2.5 (2.4-2.6)	2.2 (2.2-2.2)	3 (2.9-3.1)	2.9 (2.9-2.9)
Adults who receive treatment, %, n millions:						
Total	9.0% (8.8%-9.2%), 64.4	5.4% (3.8%-7.0%), 38.7	5.8% (5.2%-6.4%), 41.5	11.0% (10.8%-11.2%), 54.9	6.6% (4.2%-9%), 32.9	5.1% (4.6%-5.6%), 25.4
1 medication	5% (4.9%-5.1%), 35.9	0.5% (0%-1%), 3.2	1.9% (1.6%-2.2%), 13.4	4.9% (4.8%-5%), 24.6	0.5% (-0.1%-1.1%), 2.4	0.9% (0.7%-1.1%), 4.5

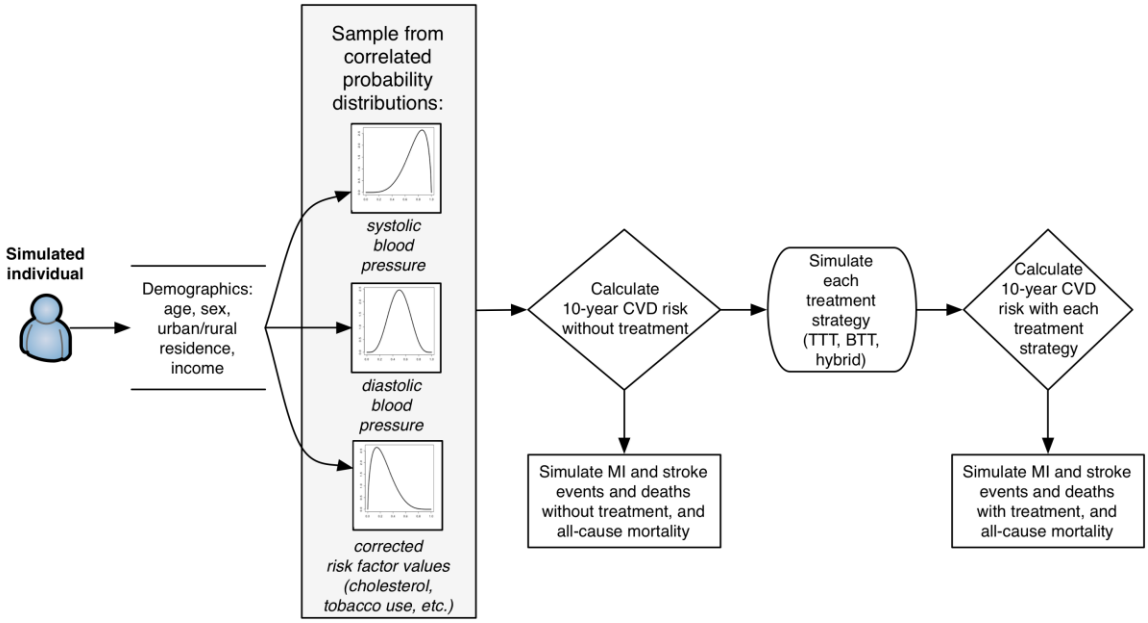
2 medications	2.4% (2.3%-2.5%), 16.9	2.2% (1.8%-2.6%), 15.9	1.3% (1.1%-1.5%), 9.5	2.9% (2.8%-3%), 14.6	2.6% (1.7%-3.5%), 12.9	0.7% (0.6%-0.8%), 3.6
3 medications	0.9% (0.9%-0.9%), 6.4	0.9% (0.6%-1.2%), 6.5	1.1% (1%-1.2%), 8.2	1.4% (1.4%-1.4%), 7.1	1% (0.7%-1.3%), 5	1.1% (1%-1.2%), 5.7
4 medications	0.7% (0.7%-0.7%), 4.8	1.8% (1.4%-2.2%), 12.9	1.5% (1.5%-1.5%), 10.5	1.8% (1.8%-1.8%), 8.9	2.5% (1.9%-3.1%), 12.4	2.4% (2.3%-2.5%), 12.1
Initial SBP among treated, in mmHg	153.7 (153.6-153.8)	144.6 (142.3-146.9)	151.4 (150.8-152)	160.3 (160.2-160.4)	147.6 (146-149.2)	158.8 (158.5-159.1)
Final SBP among treated, in mmHg	146.2 (146-146.4)	133.2 (130.3-136.1)	141 (140.5-141.5)	151.1 (150.9-151.3)	135.1 (133.4-136.8)	146.9 (146.5-147.3)

Pre-treatment 10-year CVD risk among treated, mean %	9.1 (8.2-10)	16.7 (14.8-18.6)	11.5 (9.6-13.4)	13.2 (11.1-15.3)	21.2 (15.7-26.7)	15.8 (12.4-19.2)
Post-treatment 10-year CVD risk among treated, mean %	7.1 (6.4-7.8)	11.8 (10.6-13)	8.3 (6.8-9.8)	10.1 (8.5-11.7)	15.4 (11.3-19.5)	11.8 (9.2-14.4)
MI and stroke events prevented per 10 years (by BP treatment):						
Total, millions	1.1 (0.9-1.1)	1.8 (1.5-2.1)	1.1 (0.9-1.3)	0.8 (0.7-0.9)	1.6 (1.3-1.9)	0.8 (0.7-0.9)
MI, millions	0.3 (0.3-0.3)	0.5 (0.4-0.6)	0.3 (0.2-0.4)	0.5 (0.4-0.6)	1.0 (0.8-1.2)	0.5 (0.4-0.6)

Stroke, millions	0.8 (0.7-0.9)	1.3 (1.1-1.5)	0.8 (0.6-1)	0.3 (0.3-0.3)	0.6 (0.5-0.7)	0.3 (0.3-0.3)
Number needed to treat to prevent one event	64.4 (56.6-74)	21.1 (14.7-30.1)	39.1 (28.6-54.1)	69.3 (59.9-81.3)	20.6 (12.1-33)	32.4 (26.7-39.9)
Total costs, million $US 2015	$3772 (2971-4651)	$3818 ($2851-4964)	$3699 (2685-4860)	$2587 (2228-2969)	$2426 (1648-3378)	$2202 (1772-2691)
Total DALYs averted, millions	8.0 (7.4-8.6)	12.8 (10.9-14.7)	7.9 (6.3-9.5)	6.2 (5.7-6.7)	11.1 (8.8-13.4)	5.7 (5.1-6.3)
$/DALY averted	$471.5 (401.4-540.8)	$298.2 (258.8-337.6)	$468.2 (426.1-511.5)	$417.2 (390.8-443.1)	$218.5 (185.0-252.0)	$386.3 (347.4-427.1)

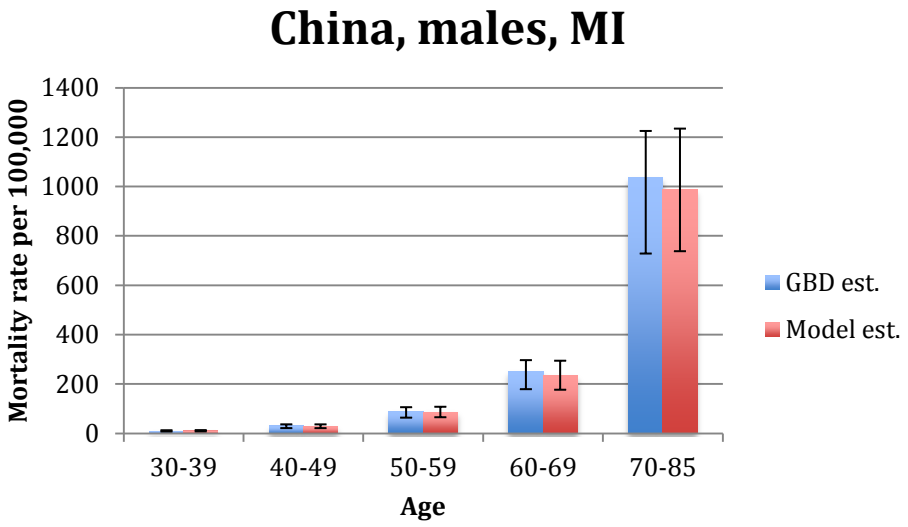
MI and stroke deaths averted, %, n thousands	3.9% (3.7%-4.4%), 389.6	6.6% (5.5%-7.7%), 654.2	4% (2.9%-5.1%), 396.1	3.2% (2.8%-3.6%), 317.2	6.4% (5.2%-7.6%), 634.4	3.2% (2.8%-3.6%), 317.2

Supplemental Figure 1: Model diagram. Individuals in each country population were organized by age group (30-39, 40-49, 50-59, 60-69, and 70-85 years old), sex, and location (urban and rural). Individuals in the model were provided with values for the key risk factors necessary to calculate their 10-year combined risk of MI and stroke (blood pressure, total cholesterol, diabetes status, tobacco smoking status, and history of prior cardiovascular events) through a multivariate sampling procedure that takes into account the correlation among age, sex, location, and the value of each risk factor for each individual (Monte Carlo sampling with copulas[1] from the distributions listed in Supplemental Tables 3-11). In each year of the ten-year simulation, individuals were simulated as experiencing an MI or stroke event based on their individual risk estimate. Those individuals experiencing an event had a probability of death from the event based on case fatality rates specific to their age, sex, and location (Supplemental Table 13),[2,3] which captures the quality of treatment. Those individuals who have an event but do not die have a 50% greater odds of subsequent events.[4] Individuals also experienced an annual probability of death from other causes, based on WHO estimates specific to age, sex and location (Supplemental Table 14).[5] Note that the correlated probability distributions shown are merely stylized distribution cartoons, not actual data, which are provided in the Supplemental Tables.


Simulated individual
Demographics: age, sex, urban/rural residence, income
Sample from correlated probability distributions:
systolic blood pressure
diastolic blood pressure
corrected risk factor values (cholesterol, tobacco use, etc.)
Calculate 10-year CVD risk without treatment
Simulate MI and stroke events and deaths without treatment, and all-cause mortality
Simulate each treatment strategy (TTT, BTT, hybrid)
Calculate 10-year CVD risk with each treatment strategy
Simulate MI and stroke events and deaths with treatment, and all-cause mortality

Supplemental Figure 2: Convergent validity check to ensure that model mortality estimates from MI and stroke by age, sex, and location had less than 5% absolute error from estimates of the Global Burden of Disease study for both (A-D) China and (E-H) India.[25]

(A)



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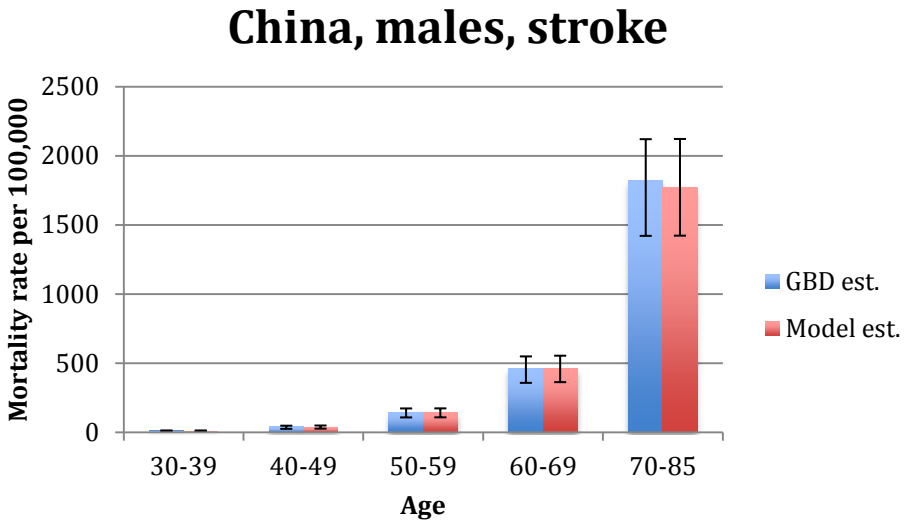
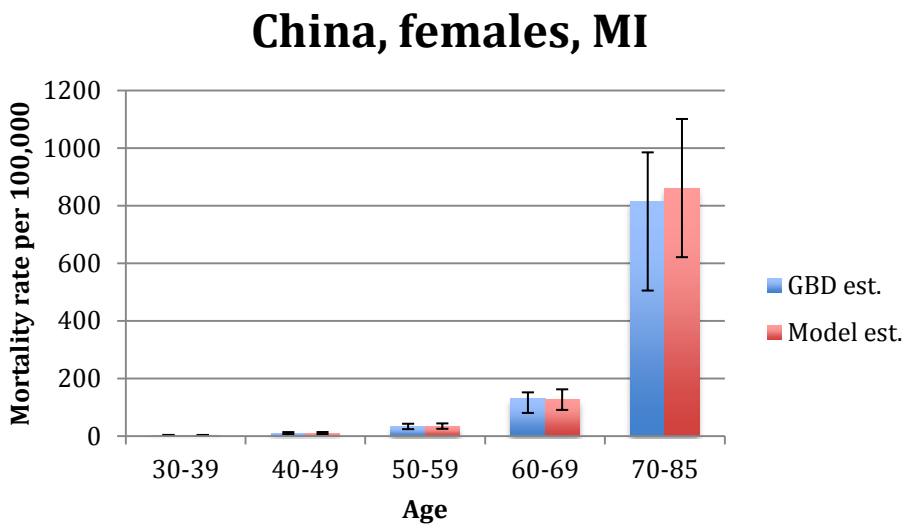
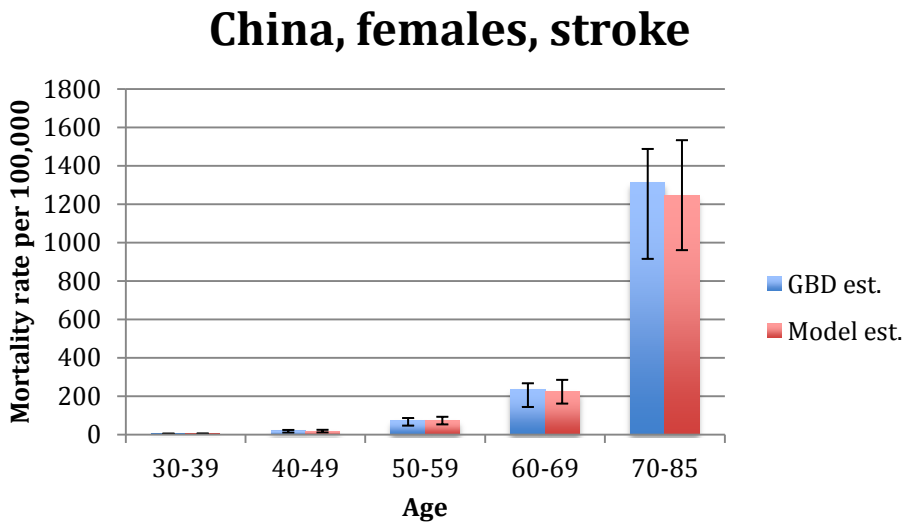

China, males, stroke
Mortality rate per 100,000
2500
2000
1500
1000
500
0
30-39
40-49
50-59
60-69
70-85
Age
GBD est.
Model est.

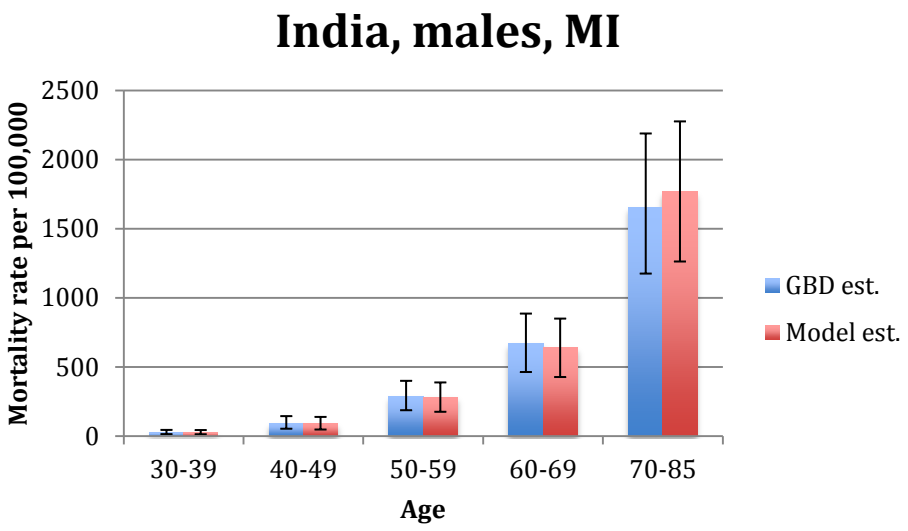
(C)


China, females, MI
Mortality rate per 100,000
1200
1000
800
600
400
200
0
30-39
40-49
50-59
60-69
70-85
Age
GBD est.
Model est.

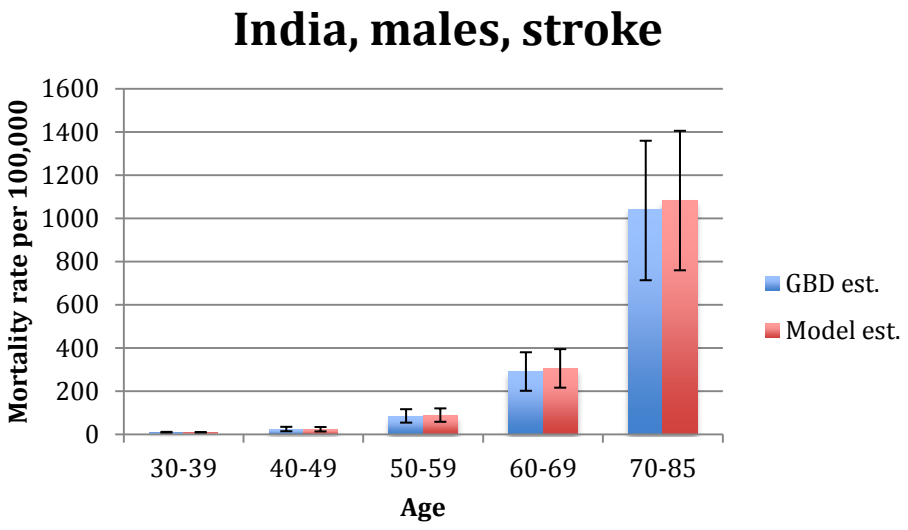
(D)


China, females, stroke
Mortality rate per 100,000
1800
1600
1400
1200
1000
800
600
400
200
0
30-39
40-49
50-59
60-69
70-85
Age
GBD est.
Model est.

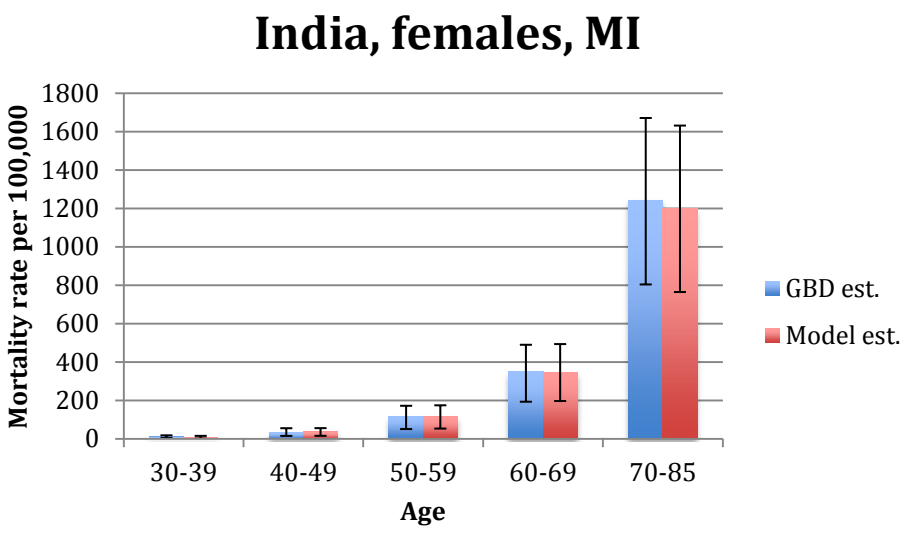
(E)


India, males, MI
Mortality rate per 100,000
2500
2000
1500
1000
500
0
30-39
40-49
50-59
60-69
70-85
Age
GBD est.
Model est.

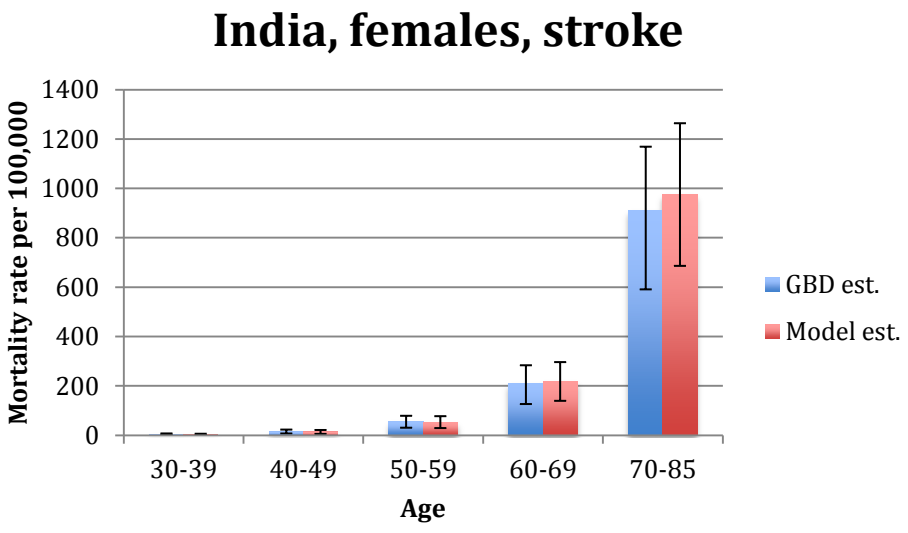
(F)


India, males, stroke
Mortality rate per 100,000
1600
1400
1200
1000
800
600
400
200
0
30-39
40-49
50-59
60-69
70-85
Age
GBD est.
Model est.

(G)

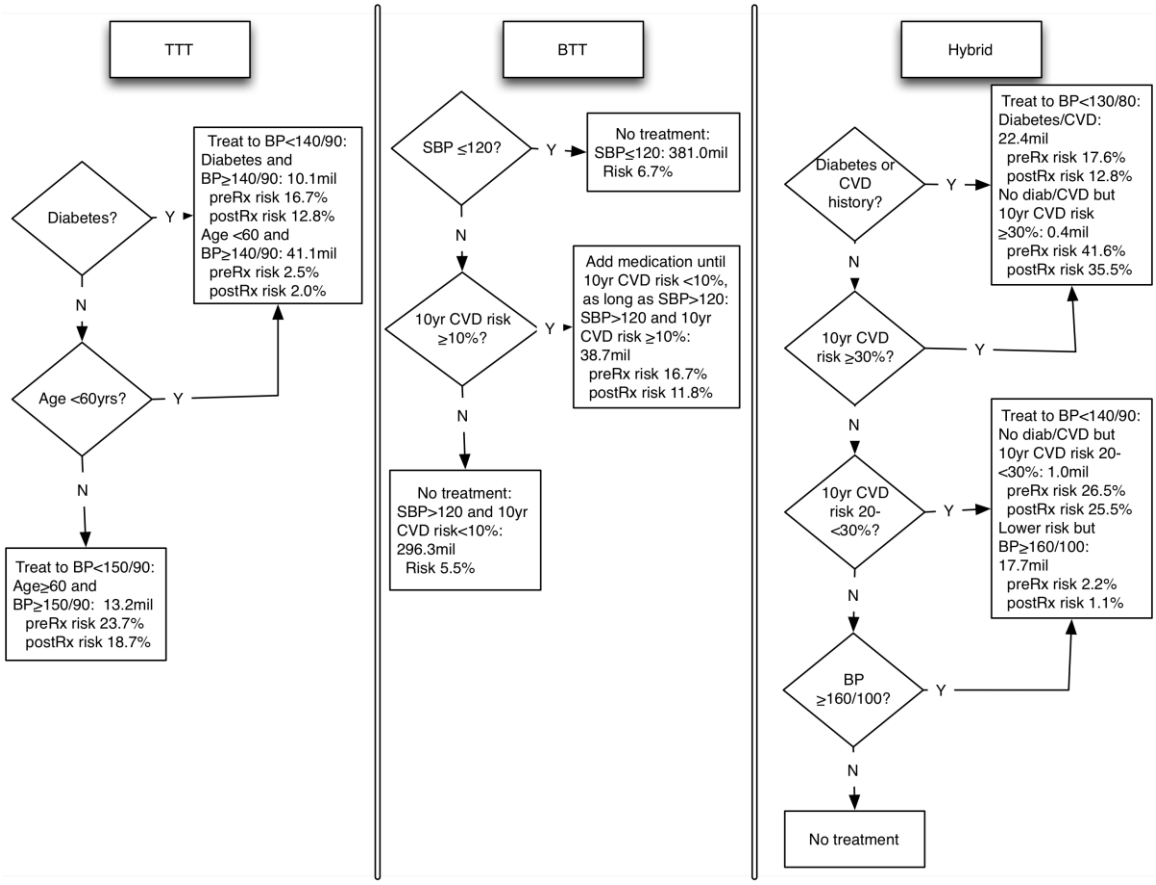

India, females, MI
Mortality rate per 100,000
1800
1600
1400
1200
1000
800
600
400
200
0
30-39
40-49
50-59
60-69
70-85
Age
GBD est.
Model est.

(H)

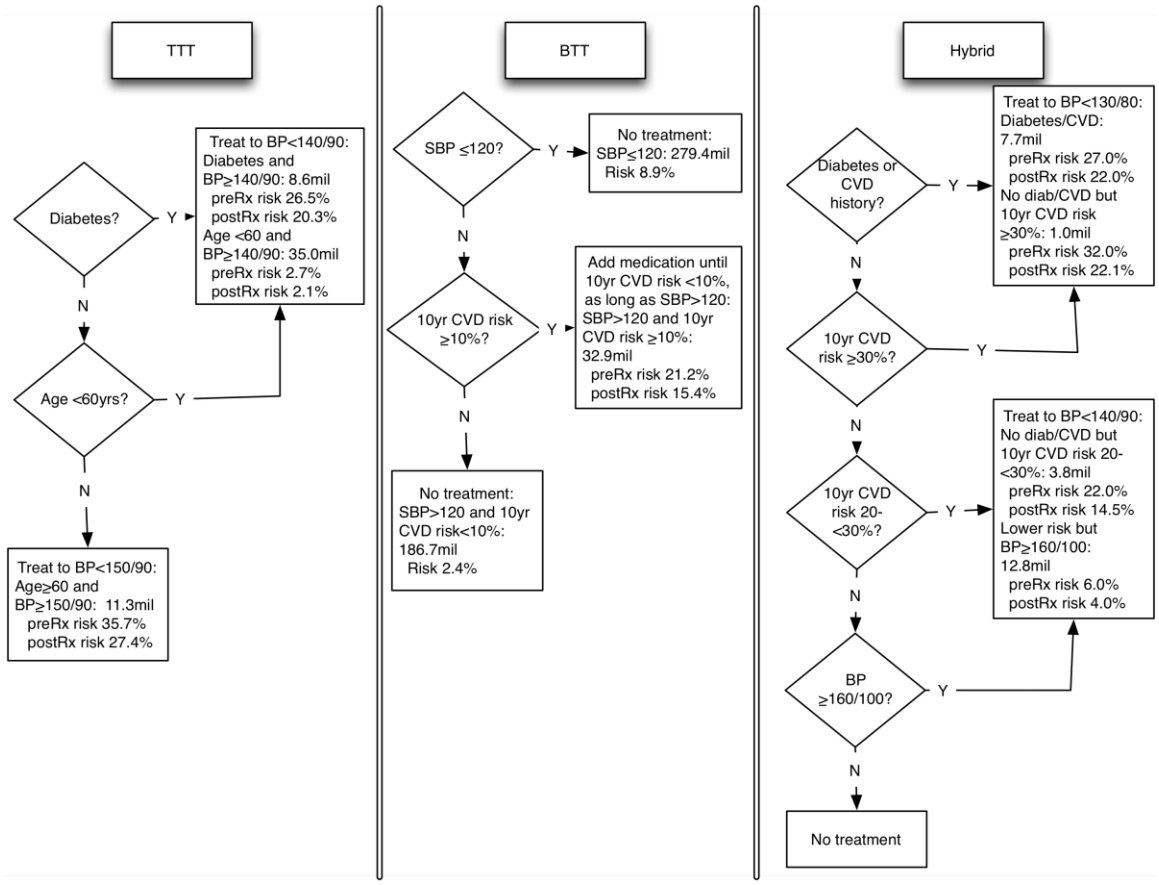

India, females, stroke
Mortality rate per 100,000
1400
1200
1000
800
600
400
200
0
30-39
40-49
50-59
60-69
70-85
Age
GBD est.
Model est.

Supplemental Figure 3: Detailed flow diagram of people treated through each treatment strategy in (A) China and (B) India, based on Figure 1 of the main text ("mil" = million people). See also Supplemental Table 17. For specificity, in cases where a blood pressure target is listed, we specifically list the number of persons who meet criteria for treatment, not just those with particular risk levels of diagnoses (e.g., in the case of treat-to-target patients with diabetes, we do not only list all people with diabetes but specify the subset of people who both have diabetes and have a blood pressure over 140/90, who would be recommended treatment under the treat-to-target algorithm).

(A)

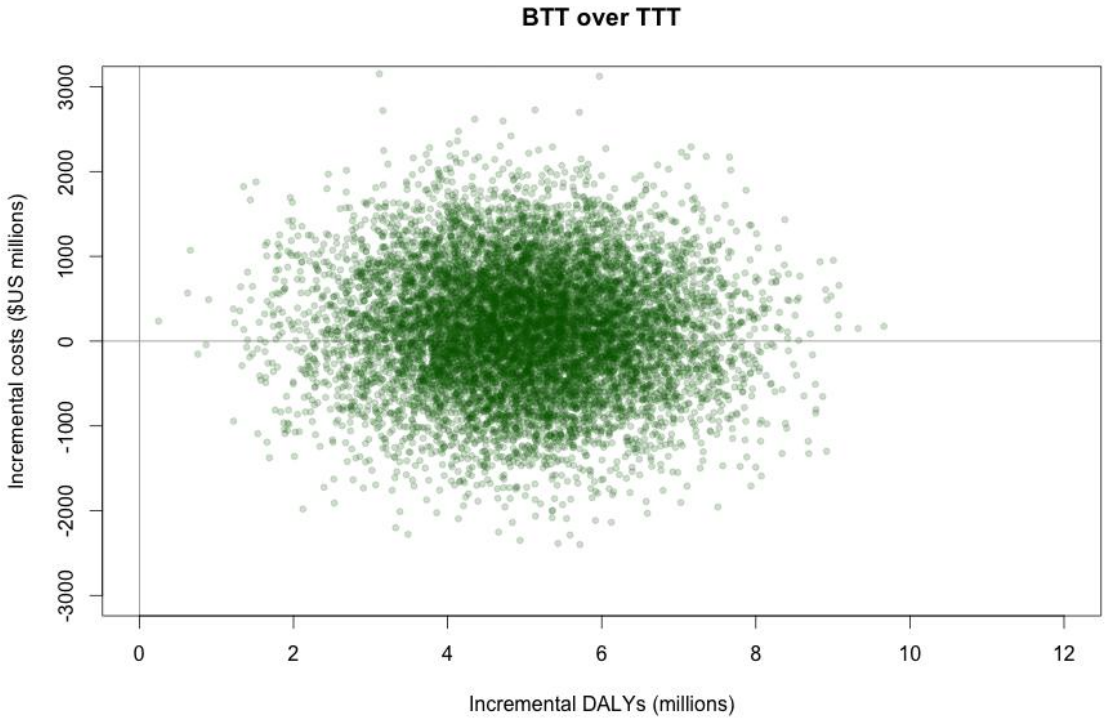

TTT
Diabetes?
Y
Treat to BP<140/90:
Diabetes and
BP≥140/90: 10.1mil
preRx risk 16.7%
postRx risk 12.8%
Age <60 and
BP≥140/90: 41.1mil
preRx risk 2.5%
postRx risk 2.0%
N
Age <60yrs?
Y
N
Treat to BP<150/90:
Age≥60 and
BP≥150/90: 13.2mil
preRx risk 23.7%
postRx risk 18.7%
BTT
SBP ≤120?
Y
No treatment:
SBP≤120: 381.0mil
Risk 6.7%
N
10yr CVD risk
≥10%?
Y
Add medication until
10yr CVD risk <10%,
as long as SBP>120:
SBP>120 and 10yr
CVD risk ≥10%:
38.7mil
preRx risk 16.7%
postRx risk 11.8%
N
No treatment:
SBP>120 and 10yr
CVD risk<10%:
296.3mil
Risk 5.5%
Hybrid
Diabetes or
CVD
history?
Y
Treat to BP<130/80:
Diabetes/CVD:
22.4mil
preRx risk 17.6%
postRx risk 12.8%
No diab/CVD but
10yr CVD risk
≥30%: 0.4mil
preRx risk 41.6%
postRx risk 35.5%
N
10yr CVD
risk ≥30%?
Y
N
10yr CVD
risk 20-
<30%?
Y
Treat to BP<140/90:
No diab/CVD but
10yr CVD risk 20-
<30%: 1.0mil
preRx risk 26.5%
postRx risk 25.5%
Lower risk but
BP≥160/100:
17.7mil
preRx risk 2.2%
postRx risk 1.1%
N
BP
≥160/100?
Y
N
No treatment

(B)

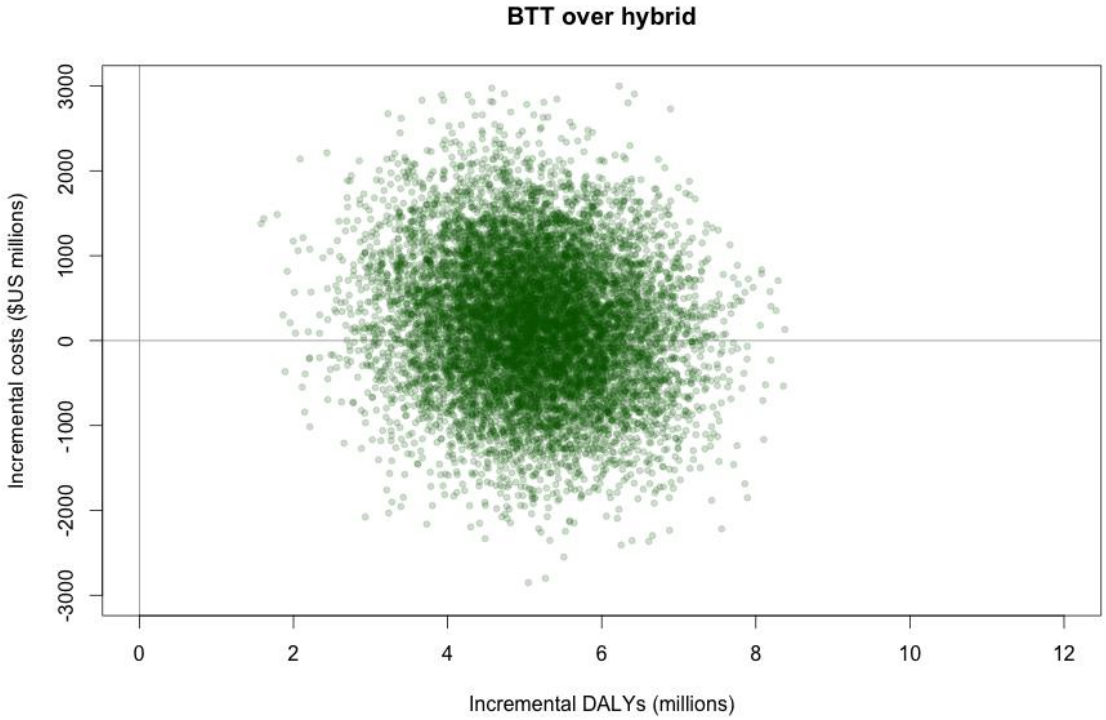

TTT
Diabetes?
Y
Treat to BP<140/90:
Diabetes and
BP≥140/90: 8.6mil
preRx risk 26.5%
postRx risk 20.3%
Age <60 and
BP≥140/90: 35.0mil
preRx risk 2.7%
postRx risk 2.1%
N
Age <60yrs?
Y
N
Treat to BP<150/90:
Age≥60 and
BP≥150/90: 11.3mil
preRx risk 35.7%
postRx risk 27.4%
BTT
SBP ≤120?
Y
No treatment:
SBP≤120: 279.4mil
Risk 8.9%
N
10yr CVD risk
≥10%?
Y
Add medication until
10yr CVD risk <10%,
as long as SBP>120:
SBP>120 and 10yr
CVD risk ≥10%:
32.9mil
preRx risk 21.2%
postRx risk 15.4%
N
No treatment:
SBP>120 and 10yr
CVD risk<10%:
186.7mil
Risk 2.4%
Hybrid
Diabetes or
CVD
history?
Y
Treat to BP<130/80:
Diabetes/CVD:
7.7mil
preRx risk 27.0%
postRx risk 22.0%
No diab/CVD but
10yr CVD risk
≥30%: 1.0mil
preRx risk 32.0%
postRx risk 22.1%
N
10yr CVD
risk ≥30%?
Y
N
10yr CVD
risk 20-
<30%?
Y
Treat to BP<140/90:
No diab/CVD but
10yr CVD risk 20-
<30%: 3.8mil
preRx risk 22.0%
postRx risk 14.5%
Lower risk but
BP≥160/100:
12.8mil
preRx risk 6.0%
postRx risk 4.0%
N
BP
≥160/100?
Y
N
No treatment

Supplemental Figure 4: Incremental cost-effectiveness plots of the benefit-tailored treatment (BTT) strategy over and above the (A) treat-to-target (TTT) strategy and (B) hybrid strategy (see main text Table 2 for details). Scatterplots display the results of 10,000 Monte Carlo simulations, sampling from the distributions of all input parameters to provide a sense of the uncertainty in the outcome.

(A)



(B)


BTT over hybrid
Incremental costs ($US millions)
3000
2000
1000
0
-1000
-2000
-3000
0
2
4
6
8
10
12
Incremental DALYs (millions)