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Aspirin for Secondary Prevention of Cardiovascular Disease in 51 Low-, Middle-, and High-Income Countries: A Cross-Sectional Study of Nationally Representative, Individual-Level Data

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91

92 **KEY POINTS**

- 93 **Question:**
- 94 What is the prevalence of aspirin use among people with a history of cardiovascular disease in
- 95 low-, middle- and high-income countries?
- 96

97 Findings:

- 98 Among individuals with a self-reported history of cardiovascular disease, aspirin use for
- 99 secondary prevention was 40.3% (95% CI: 37.6%-43.0%) in the pooled sample and ranged
- 100 from 16.6% (95% CI: 12.4%-21.9%) in low-income countries to 65.0% (95% CI: 59.1%-70.4%)
- 101 in high-income countries.
- 102
- 103 Meaning:
- 104 The overall findings suggest suboptimal use of aspirin for secondary prevention of
- 105 cardiovascular disease in many countries around the world.
- 106

107 ABSTRACT

108 **Importance**:

- 109 Aspirin is an effective and low-cost option for reducing atherosclerotic cardiovascular disease
- 110 (CVD) events and improving mortality among individuals with established CVD. To guide efforts
- to mitigate the global CVD burden, there is a need to understand current levels of aspirin use for
- 112 secondary prevention of CVD.

113

- 114 **Objective:**
- 115 To report and evaluate aspirin use for secondary prevention of CVD across low-, middle-, and
- 116 high-income countries.

117

- 118 Design, Setting, Participants
- 119 Cross-sectional analysis using pooled, individual-participant data from nationally representative
- 120 health surveys conducted between 2013-2020 in 51 low-, middle-, and high-income countries.
- 121 Included surveys contained data on self-reported history of CVD and aspirin use. The sample of
- 122 participants included non-pregnant adults aged 40-69 years.

123

124 **Exposures**:

125 Countries' per-capita income levels and world region; individuals' socioeconomic demographics.

126

- 127 Main Outcomes and Measures:
- 128 Self-reported use of aspirin for secondary prevention of CVD.

- 130 **Results:**
- 131 The overall pooled sample included 124,505 individuals. The median age was 52 (IQR: 45-59)
- 132 years, and 50.5% (95% CI: 49.9%-51.1%) were women. A total of 10,589 individuals had self-

reported history of CVD (8.1% [95% CI: 7.6%-8.6%]). Among individuals with a prior history of

134 CVD, aspirin use for secondary prevention in the overall pooled sample was 40.3% (95% CI:

135 37.6%-43.0%). By income group, estimates were 16.6% (95% CI: 12.4%-21.9%) in low-income

136 countries, 24.5% (95% CI: 20.8%-28.6%) in lower-middle-income countries, 51.1% (95% CI:

- 137 48.2%-54.0%) in upper-middle-income countries, and 65.0% (95% CI: 59.1%-70.4%) in high-
- 138 income countries.
- 139

140 **Conclusion and Relevance:**

141 Worldwide, aspirin is underused in secondary prevention, particularly in low-income countries.

- 142 National health policies and health systems must develop, implement, and evaluate strategies
- 143 to promote aspirin therapy.
- 144
- 145 **Trial Registration**:
- 146 Not applicable.

148 **INTRODUCTION**

Aspirin is widely used for its non-steroidal anti-inflammatory and anti-platelet properties.^{1,2} In the

150 prevention of atherosclerotic cardiovascular disease (CVD), aspirin is an effective and low-cost

151 option for reducing CVD events and improving mortality among individuals with established

152 CVD.^{3,4} The role of aspirin in the primary prevention of CVD is less clear.⁵

153

154 Cardiovascular diseases are the leading cause of global mortality and loss of disability-adjusted 155 life years.⁶ To ensure an effective and efficient health system to prevent CVD, it is important to 156 understand whether medication use is commensurate with need.⁷ Suboptimal prevention of 157 CVD can have devastating effects on individuals, health systems, and economies. 158 Implementation of evidence-based pharmacotherapy including aspirin is important to achieve 159 Target 3.4 of the United Nations Sustainable Development Goal (SDG), which aims for a one-160 third reduction in premature mortality from non-communicable diseases (NCDs) including CVD by 2030.^{8–10} There also is a need to benchmark progress toward the key 2025 World Health 161 162 Organization (WHO) target that at least 50% of eligible people receive aspirin for CVD 163 prevention.¹¹ 164 165 The current study aims to provide updated evidence on worldwide aspirin use among individuals 166 with a history of CVD. Using nationally representative health surveys, we estimate aspirin use 167 for secondary prevention of CVD and report its association with individual-level characteristics.

168

169 **METHODS**

170 Study design and data sources

171 We conducted a cross-sectional analysis using pooled, individual-participant data from

172 nationally representative health surveys conducted in 51 low-, lower-middle-, upper-middle-, and

173 high-income countries. Details of the systematic processes to pool eligible national health

174 surveys were reported previously and are summarized in eMethods 1.^{12,13} We started with a list 175 of all countries with a World Bank income group classification.¹⁴ Surveys identified in each 176 country were eligible to be included in this study if they (1) used a nationally representative 177 sampling frame, (2) had been conducted in 2013 or after, (3) had availability of individual-178 participant survey data, and (4) asked respondents questions on the use of aspirin for 179 prevention of CVD. Details on included surveys are provided in eMethods 2-3. We chose 2013 180 as the initial year of survey eligibility to align with the WHO's release of a new version of the 181 Stepwise Approach to NCD Risk-Factor Surveillance (STEPS) survey containing questions on 182 aspirin use and prior CVD status.¹⁵ All were national household surveys except for the survey in 183 Czech Republic, which sampled from health insurance registries covering 85% of the 184 population.¹⁶ We reported overall response rates according to definitions from the American Association for Public Opinion Research.¹⁷ This study was considered exempt from regulation 185 186 by the institutional review board at the University of Michigan (HUM00201307), as the research 187 used coded data that the investigators could not link to specific individuals. 188

189 Sample

The sample included non-pregnant individuals ages 40-69 years. This age range was chosen to focus on middle-aged and older individuals with a higher likelihood of developing or having CVD and to align with recommended age ranges for monitoring the WHO and SDG targets.^{8–11}

193 Exceptions included Burkina Faso, Czech Republic, Kyrgyzstan, Myanmar, and Tokelau, as

surveys in these countries had an upper age limit of sample eligibility of 64 years.

195

196 **Outcome definitions**

Our primary outcome was aspirin use for secondary prevention of CVD. Aspirin use was defined
by self-report among respondents using the medication to prevent a CVD event (eTable 1). For

example, STEPS surveys ask the following question: "Are you currently taking aspirin regularlyto prevent or treat heart disease?"

201

202 Secondary prevention of CVD

We defined secondary prevention of CVD among individuals with a self-reported history of prior
myocardial infarction, stroke, or angina. For example, STEPS surveys ask the following
question: "Have you ever had a heart attack or chest pain from heart disease (angina) or a
stroke (cerebrovascular accident or incident)?"¹⁸ Because aspirin is widely recommended for
secondary prevention of CVD, we classified all individuals self-reporting prior CVD as eligible for
aspirin therapy.^{4,19-23}

209

210 Statistical analysis

211 We first harmonized variables needed for this analysis from each survey, as detailed previously.^{12,13} We then combined individual-level data from all surveys to construct a pooled 212 213 dataset. We estimated the proportion of individuals using aspirin for secondary prevention of 214 CVD across the pooled sample, by World Bank per-capita income categories¹⁴ (i.e., low-income, 215 lower-middle-income, upper-middle-income, and high-income), and by country. We also 216 considered each country's income level as a continuous variable by plotting estimates against 217 per-capita gross national income (eTable 2).²⁴ To explore individual characteristics associated 218 with aspirin use for secondary prevention of CVD in the pooled sample, we estimated 219 proportions across individual characteristics of age (40-49, 50-59, and 60-69 years), sex, 220 educational attainment (less than primary school, primary school, and secondary school or 221 greater), and urban versus rural residence.

222

We accounted for complex survey design by considering sampling strata and primary sampling units with appropriate subpopulation specification. To obtain pooled estimates, we rescaled

225 sample weights in proportion to each country's population aged 40-69 years and ran commands over the pooling unit (i.e., overall or income group).²⁵ Following this approach, our results can 226 227 be interpreted as being representative of the population aged 40-69 years across included 228 countries. We report unadjusted estimates, except in our analysis of individual characteristics 229 associated with aspirin use for secondary prevention of CVD, in which we age-standardized to 230 the WHO reference population.²⁶ A complete case analysis was conducted as missingness was 231 approximately 1% or lower across key variables (eTable 3). We conducted our analysis in Stata 232 version 17.0 and R version 4.2.2.

233

234 **RESULTS**

235 Survey and sample characteristics

236 The pooled dataset included nationally representative health surveys conducted from 2013-237 2020 in 51 countries (Figure 1, eFigure 1, eTables 4-5). By World Bank income group, seven 238 surveys were conducted in low-income countries, 23 in lower-middle-income countries, 14 in 239 upper-middle-income countries, and seven in high-income countries. All but three surveys 240 (Czech Republic, England, and the United States [U.S.]) were conducted as part of the WHO 241 STEPS program.^{16,27,28} The median response rate was 85% (interquartile range [IQR]: 70%-242 95%) in the 50 surveys reporting a response rate (eTable 6). Response rates were lower in 243 high-income countries (median: 57%) than in other income groups (median: 98%, 86%, and 244 82% in low-income, lower-middle-income, and upper-middle-income countries, respectively). 245 246 The overall pooled sample included 124,505 individuals (Table 1). Weighted across surveys,

respondents' median age was 52 (IQR: 45-59) years, 50.5% (95% CI: 49.9%-51.1%) were
women, and 53.4% (95% CI: 52.0%-54.8%) lived in a rural area. There were 10,589 individuals
with a prior history of CVD (weighted 8.1% [95% CI: 7.6%-8.6%]). Further details of the study
subpopulation with a prior history of CVD are provided in eTables 7-8.

252	Aspirin use for secondary prevention of CVD across the pooled sample and by income
253	group
254	Among individuals with a self-reported history of CVD, aspirin use for secondary prevention in
255	the overall pooled sample was 40.3% (95% CI: 37.6%-43.0%). By income group, estimates
256	were 16.6% (95% CI: 12.4%-21.9%) in low-income countries, 24.5% (95% CI: 20.8%-28.6%) in
257	lower-middle-income countries, 51.1% (95% CI: 48.2%-54.0%) in upper-middle-income
258	countries, and 65.0% (95% CI: 59.1%-70.4%) in high-income countries (Figure 2).
259	
260	Aspirin use for secondary prevention of CVD across countries
261	At the country level, 41% of the variation in aspirin use for secondary prevention ($R^2=0.41$) was
262	accounted for by per-capita income (Figure 3, eTable 9). Countries meeting the WHO target that
263	at least 50% of eligible people receive aspirin for secondary CVD prevention included Belarus,
264	Czech Republic, England, Iran, Iraq, Jordan, Kuwait, Lebanon, Turkmenistan, and the United
265	States.
266	
267	Aspirin use for secondary prevention of CVD across individual characteristics
268	In the overall pooled sample, among those with a prior CVD history, greater aspirin use was
269	observed among individuals who were older, male, had higher levels of education, and lived in
270	urban as opposed to rural areas. There were consistent gradients of greater aspirin use in
271	countries with more income within a given individual characteristic (Figure 4, eTables 10-11). In
272	high-income versus low-income countries, the absolute difference in aspirin use for secondary
273	prevention was two to five-fold greater relative use and between 20% to 60% greater absolute
274	use by age, sex, education, or rural versus urban residence (eTable 12-13).
275	

DISCUSSION

In a diverse set of nationally representative surveys from 51 countries, fewer than half of eligible
people in the overall pooled sample, including less than one-quarter in low- and lower-middleincome countries, were taking aspirin for secondary prevention of CVD. These results suggest
underuse of aspirin use for secondary CVD prevention globally.

281

To our knowledge, the current study provides the most extensive and updated estimates of the worldwide use of aspirin for secondary prevention of CVD. Our findings revealed marked inequities worldwide, as illustrated by four-fold greater aspirin use for secondary CVD prevention in high-income compared to low-income countries. None of the 30 low- or lowermiddle-income countries in our sample achieved the WHO target that at least 50% of eligible individuals with a history of CVD take aspirin. Only about half of upper-middle- and high-income countries included in our analysis achieved this target.¹¹

289

290 Previously, the Prospective Urban Rural Epidemiology (PURE) cohort study reported on use of 291 secondary prevention drugs in 17 countries. Using data collected from 2003 to 2009, PURE 292 investigators found that use of anti-platelet therapy including aspirin was 11% in low-income 293 countries, 20% in lower-middle-income countries, 27% in upper-middle-income countries, and 64.1% in high-income countries.²⁹ PURE's findings were generally consistent with other studies 294 conducted in China, Denmark, Italy, Spain, the United Kingdom, and the U.S.^{30–32} The current 295 296 study overcomes the limitations of prior studies by using recent, nationally representative survey 297 data from a larger sample of countries. We find similar results to PURE more than a decade 298 later. Despite considerable international efforts to improve access to CVD medicines, especially 299 in low- and middle-income countries (LMICs), our study reinforces that more work is needed. 300

There is a need to reflect on the lack of progress over the last decade on use of aspirin and
 other CVD medicines in LMICs.^{13,33} CVD prevention efforts are complex and must be

contextualized to each country, including its patients, clinicians, and health system.³⁴ For
example, countries with a high burden of prevalent CVD may benefit from more aggressive
policies to improve evidence-based aspirin use. However, many patients may not understand
the role of aspirin in CVD prevention or have variable access to aspirin, whether through
prescriptions or over the counter.³⁵ As highlighted in the current study, an individual country with
greater economic resources may find it more feasible to scale-up, sustain, and codify systemlevel CVD care.

310

311 At the same time, some innovations and programs may offer generalizable lessons across 312 countries to address the underuse of aspirin for secondary prevention and, consequently, CVD-313 related mortality. One innovation is the use of fixed-dose combination therapies ("polypills"), 314 which may include aspirin in addition to anti-hypertensive and statin therapies. Polypills improve 315 patient adherence and are effective in secondary prevention of CVD even in high-income countries with high rates of drug therapy.^{36,37} The WHO HEARTS program, launched in 2016, 316 317 recommends an integrated, multicomponent approach to population-level CVD care, including 318 appropriate use of aspirin.³⁸ HEARTS has shown excellent results in improving blood pressure 319 control in more than a dozen countries, and future work could assess whether the HEARTS platform can be leveraged to maximize aspirin use for secondary prevention of CVD.³⁹ Finally, 320 321 repurposing system-level strategies deployed to manage other chronic conditions such as HIV 322 may help to address CVD medication use.⁴⁰

323

324 Limitations

There are several limitations to our study. First, it was not possible to define with certainty whether an individual's aspirin use was appropriate. The appropriateness of aspirin therapy could be confounded by antithrombotic or other antiplatelet therapies that may be a relative contraindication to aspirin due to elevated bleeding risk. Only three surveys captured data on

329 use of other antithrombotic and other antiplatelet drugs or the specific aspirin dose. Most 330 included surveys did not ask questions that permitted us to distinguish among individuals who 331 had heart disease versus strokes, or whether a stroke was ischemic or hemorrhagic. Second, 332 while the overall median response rate was 85%, response rates tended to be lower in high-333 income countries. In recent years, many survey programs such as U.S. NHANES have 334 experienced declining response rates that require enhanced weighting adjustments.⁴¹ We used 335 sampling weights adjusted for nonresponse, but it is possible that nonresponse bias could be 336 larger in high-income countries than in other countries in our sample. Third, we used self-337 reported data on aspirin use and CVD history. Self-reported indicators are recommended in the WHO NCD Monitoring Framework and have been accurate in prior studies.^{18,29,42,43} In the case 338 339 of aspirin use, self-reported data is important as aspirin is obtained over the counter in many 340 countries. Fourth, there were slight variations in survey design across countries, but surveys 341 were comparable in using nationally representative sampling frames. Fifth, included surveys 342 were conducted in different years between 2013 to 2020. Results may not reflect the current 343 use of aspirin in each country. Finally, surveys on aspirin use were not available from some 344 large countries (e.g., India and China) or high-income countries in Asia. Our findings may not be 345 generalizable to countries and regions where surveys were not included. This limitation was 346 balanced by inclusion of surveys from a diverse sample of countries across world regions and a 347 broad spectrum of economic development.

348

349 Conclusion

Worldwide, aspirin is underused in secondary prevention, particularly in low-income countries.
To meet the goal of reducing premature mortality from NCDs, including CVD, national health
policies and health systems must develop, implement, and evaluate strategies to promote
evidence-based use of aspirin.

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360	
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362	collection, management, analysis, and interpretation of the data; preparation, review, or
363	approval of the manuscript; and decision to submit the manuscript for publication.
364	
365	Conflict of Interest Disclosures: None.
366	
367	Data sharing: Data included in this study are publicly available with registration for 45 of the 51

368 included country surveys. Further details on accessing data is provided in eMethods 3.

Figure 1: Map of included countries by income group





- from 2013-2020, approximate per-capita income thresholds were: low-income countries;
- <\$1,000; lower-middle-income countries, \$1,000-\$4,000; upper-middle-income countries,
- \$4,000-12,000; high-income countries, >\$12,000. The figure was created in MapChart using the
- Winkel Tripel projection, which minimizes distortions in country land area between the equator
- and poles.⁴⁴ The United Kingdom was shaded though the included survey came only from
- England.

372

382 Table 1: Characteristics of study population

Characteristic	Low-income countries	Lower middle- income countries	Upper-middle- income countries	High-income countries	Overall	
	n=7 countries	n=23 countries	n=14 countries	n=7 countries	n=51 countries	
Total No.	12,637	52,014	39,080	20,774	124,505	
Age, median (IQR), years	49 (43-55)	51 (45-58)	51 (45-59)	54 (47-61)	52 (45-59)	
Age categories						
40-49 years	49.9 (48.5-51.3)	44.8 (43.8-45.8)	43.7 (43.0-44.4)	34.0 (32.2-35.9)	41.0 (40.2-41.9)	
50-59 years	32.8 (31.6-34.1)	32.5 (31.6-33.4)	34.1 (33.4-34.7)	36.3 (34.6-38.1)	34.2 (33.5-35.0)	
60-69 years	17.3 (16.2-18.3)	22.7 (21.6-23.8)	22.2 (21.6-22.8)	29.7 (27.6-31.8)	24.7 (23.8-25.6)	
Sex						
Male	52.3 (50.5-54.1)	50.5 (49.5-51.5)	48.2 (47.6-48.8)	48.5 (47.4-49.6)	49.5 (48.9-50.1)	
Female	47.7 (45.9-49.5)	49.5 (48.5-50.5)	51.8 (51.2-52.4)	51.5 (50.4-52.6)	50.5 (49.9-51.1)	
Education ^a						
Total No.	12,602	51,286	38,170	20,531	122,589	
No schooling	58.0 (56.0-60.0)	27.9 (26.7-29.1)	16.7 (16.1-17.4)	0.0 (0.0-0.0)	16.1 (15.2-17.0)	
Primary	30.4 (28.8-32.1)	32.5 (31.1-33.8)	35.6 (34.8-36.4)	6.8 (5.8-7.9)	21.7 (20.6-22.9)	
≥Secondary	11.5 (10.5-12.7)	39.7 (38.3-41.1)	47.7 (46.8-48.5)	93.2 (92.1-94.2)	62.2 (60.4-64.0)	
Residence ^b						
Total No.	12,637	37,239	31,070	10,402	91,348	
Urban	27.8 (24.8-31.1)	32.4 (31.4-33.4)	69.3 (68.3-70.2)	74.2 (67.7-79.9)	46.6 (45.2-48.0)	
Rural	72.2 (68.9-75.2)	67.6 (66.6-68.6)	30.7 (29.8-31.7)	25.8 (20.1-32.3)	53.4 (52.0-54.8)	
Prior CVD ^c						
Total No.	12,618	51,825	38,795	20,765	124,003	
Yes	8.6 (7.6-9.8)	10.0 (9.2-10.7)	6.6 (6.2-7.0)	7.0 (6.1-8.1)	8.1 (7.6-8.6)	
Diabetes ^c						
Total No.	12,618	51,827	38,308	20,768	123,521	
Yes	2.7 (2.1-3.3)	7.6 (7.1-8.2)	15.1 (14.6-15.7)	13.1 (11.9-14.4)	10.7 (10.2-11.2)	
Hypertension ^c						
Total No.	12,323	51,828	38,609	20,768	123,528	
Yes	14.0 (12.8-15.4)	22.7 (21.9-23.6)	31.6 (30.9-32.3)	37.7 (35.5-40.0)	29.8 (28.8-30.9)	
Systolic blood pressure, median (IQR), mmHg	125.5 (114.5-140.0)	127.3 (115.7-142.3)	130.0 (119.3-143.7)	124.0 (114.0-136.0)	126.3 (115.7-140.0)	
Current smoking						
Total No.	12,632	51,871	38,824	20,742	124,069	
Yes	10.1 (9.1-11.1)	24.2 (23.2-25.2)	18.4 (17.9-19.0)	20.9 (19.4-22.5)	20.9 (20.2-21.7)	
BMI	· · · · ·			· · · · ·	· /	
Total No.	12,445	49,591	37,954	18,073	118,063	
Median (IQR), kg/m²	21.6 (19.4-24.8)	23.1 (20.3-26.3)	27.8 (24.8-31.4)	28.8 (25.1-33.3)	25.8 (22.2-30.2)	

Values are reported as percentages unless otherwise indicated. Estimates account for survey design and 383 384 weighting by each country's 2019 population of individuals aged 40-69 years. Values are reported as percentages unless otherwise indicated. Weighted estimates of median (IQR) are calculated using the ecptile 385 command in Stata. Income group thresholds are based on gross national income per capita in US\$ (Atlas 386 methodology, not purchasing power parity-adjusted) in the year the survey was conducted.¹⁴ Further details on 387 388 missing data by country are provided in eTable 3. aNo education is defined as less than primary school or no 389 formal schooling; primary is defined as only primary school completed; secondary is defined as secondary, high school, college, or post-graduate degree. Education was unavailable in the survey from Tokelau. ^bWe 390 used each country's definition of rural or urban residence. These definitions are typically set by a country's 391 392 national statistics office or census bureau.⁴⁵ Rural versus urban residence was unavailable in the surveys from Bermuda, Botswana, Brunei, Ecuador, Eswatini, Kiribati, Kuwait, Lebanon, Myanmar, Nauru, Solomon Islands, 393 394 Sri Lanka, St. Vincent & the Grenadines, Tajikistan, Timor-Leste, Tokelau, Tuvalu, and United States. Based 395 on self-reported diagnosis.

Figure 2: Among those eligible, use of aspirin for secondary prevention of CVD by income group, age, sex, education, and rurality

Characteristic	No. of countries	n/N	Weighted proportion, % (95% CI)		Difference from reference, % (95% CI)	Prevalence ratio, % (95% Cl)	
Income group Low income Lower middle Upper middle High income	7 23 14 7	172/1,037 1,522/5,557 1,435/2,776 661/1,219	16.6 (12.4 to 21.9) 24.5 (20.8 to 28.6) 51.1 (48.2 to 54.0) 65.0 (59.1 to 70.4)	*	0 (ref) 7.9 (1.7 to 14.0) 34.5 (28.9 to 40.0) 48.3 (40.9 to 55.7)	1 (ref) 1.47 (0.99 to 1.95) 3.07 (2.18 to 3.96) 3.90 (2.74 to 5.07)	
Age 40-49 years 50-59 years 60-69 years	51	676/3,100 1,365/3,812 1,749/3,677	22.6 (19.5 to 26.0) 39.1 (35.1 to 43.3) 53.3 (47.9 to 58.6)	-	0 (ref) 16.5 (11.2 to 21.9) 30.7 (23.9 to 37.5)	1 (ref) 1.73 (1.42 to 2.05) 2.36 (1.91 to 2.81)	- -
Sex Male Female	51	1,722/4,219 2,068/6,370	39.0 (36.2 to 41.9) 31.0 (28.1 to 34.1)	-	0 (ref) -7.9 (-12.1 to -3.8)	1 (ref) 0.80 (0.70 to 0.89)	-
Education No schooling Primary education Secondary or above	50	405/1,603 991/2,962 2,346/5,895	24.6 (19.7 to 30.4) 29.0 (25.8 to 32.4) 42.6 (39.7 to 45.6)	-	0 (ref) 4.3 (-1.6 to 10.3) 18.0 (11.8 to 24.2)	1 (ref) 1.18 (0.90 to 1.45) 1.73 (1.33 to 2.13)	
Residence Urban Rural	33	1,788/4,203 1,078/3,526	35.0 (32.3 to 37.8) 25.1 (21.4 to 29.1)	-	0 (ref) -10.0 (-14.7 to -5.2)	1 (ref) 0.72 (0.59 to 0.84)	
Overall	51	3,790/10,589	40.3 (37.6 to 43.0)	•			
				0 20 40 60 80 1	00		25.51248
Weighted proportion, % (95% CI)							Prevalence ratio

Weighted proportion, % (95% CI) Prevalence ratio Prevalence rati

404 Solomon Islands, Sri Lanka, St. Vincent & the Grenadines, Tajikistan, Timor-Leste, Tokelau, Tuvalu, and United States. Ref: Reference category.

Figure 3: Among those eligible, aspirin use for secondary prevention of CVD by country per-capita income

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409 Colors show each country's super region using the Global Burden of Disease classification

410 system; "high-income" in this classification system is different than the World Bank per-capita

411 income category (eTable 5). Per-capita income is defined as gross national income per capita in

412 purchasing power parity-adjusted dollars (constant 2017 international \$) in the year the survey

413 was conducted. Estimates account for survey design and weighting. Underlying estimates and

414 95% CIs are provided in eTable 9.



415 Figure 4: Among those eligible, proportion of individuals using aspirin for secondary prevention of CVD by age, sex, education, and rurality across income groups

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420 Estimates account for survey design, direct standardization of age to the World Health

421 Organization reference population, and weighting by each country's 2019 population of 422 individuals aged 40-69 years. The error bars represent 95% CIs. aNo education is defined as 423 less than primary school or no formal schooling; primary is defined as only primary school 424 completed; secondary is defined as secondary, high school, college, or post-graduate degree. 425 Education was unavailable in the survey from Tokelau. ^bWe used each country's definition of rural or urban residence. These definitions are typically set by a country's national statistics 426 427 office or census bureau.⁴⁶ Rural versus urban residence was unavailable in the surveys from Bermuda, Botswana, Brunei, Ecuador, Eswatini, Kiribati, Kuwait, Lebanon, Myanmar, Nauru, 428 429 Solomon Islands, Sri Lanka, St. Vincent & the Grenadines, Tajikistan, Timor-Leste, Tokelau,

Tuvalu, and United States. Underlying data provided in eTables 9-13. 430

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