



HAL
open science

Diminishing benefits of urban living for growth and development of school-aged children and adolescents in the 21st century

Anu Mishra, Bin Zhou, Andrea Rodriguez-Martinez, Honor Bixby, Rosie Singleton, Rodrigo Carrillo-Larco, Kate Sheffer, Christopher Paciorek, James Bennett, Victor Lhoste, et al.

► To cite this version:

Anu Mishra, Bin Zhou, Andrea Rodriguez-Martinez, Honor Bixby, Rosie Singleton, et al.. Diminishing benefits of urban living for growth and development of school-aged children and adolescents in the 21st century. *Nature*, 2023, 615 (7954), pp.874-883. 10.1038/s41586-023-05772-8 . hal-04172464

HAL Id: hal-04172464

<https://hal.science/hal-04172464v1>

Submitted on 30 Nov 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

- 1 **Title: Diminishing benefits of urban living for growth and development of school-aged**
- 2 **children and adolescents in the 21st century**
- 3 **Authors: NCD Risk Factor Collaboration (NCD-RisC)**

4 **Optimal growth and development in late childhood and adolescence is critical for lifelong**
5 **health and wellbeing. Many health programmes narrowly focus on specific features of**
6 **diet and the environment in cities or rural areas¹⁻⁶, with little consideration of the**
7 **similarities or differences in growth and development outcomes in these settings. We**
8 **used 2,325 population-based studies, with measurement of height and weight in 71**
9 **million participants, to report trends from 1990 to 2020 in height and body-mass index**
10 **(BMI) of children and adolescents aged 5-19 years by rural and urban place of residence**
11 **in 200 countries and territories. In 1990, children and adolescents in cities were taller**
12 **than their rural counterparts in all but a few, mostly high-income, countries. By 2020, the**
13 **urban height advantage became smaller in most countries, and in many high-income**
14 **western countries reversed into a small urban disadvantage. The exception, where the**
15 **urban height advantage increased, was for boys in most countries in sub-Saharan Africa,**
16 **and in some countries in Oceania, South Asia, and the region of central Asia, Middle East**
17 **and north Africa. In many of these countries, successive cohorts of rural boys either did**
18 **not gain height or possibly even became shorter. The difference between age-**
19 **standardised mean BMI of children in urban and rural areas was <1.1 kg/m² in the vast**
20 **majority of countries throughout this period. Within this relatively small range, BMI**
21 **increased slightly more in cities than in rural areas, except in south Asia, sub-Saharan**
22 **Africa, and some countries in central and eastern Europe, where rural BMI increased**
23 **more. In many countries in sub-Saharan Africa, rural BMI surpassed the median of the**
24 **WHO reference population, and in some cases approached the threshold for being**
25 **overweight. Our results show that in much of the world, the growth and developmental**
26 **advantages of living in cities have diminished in the 21st century, whereas in much of**
27 **sub-Saharan Africa they have amplified. These global trends, and the macroeconomic,**
28 **social and health system policies that underlie them, have made rural Africa the**

29 **epicentre of suboptimal growth and development during school ages, with long-term**
30 **adverse consequences for health and wellbeing.**

31

32 Throughout school ages (i.e., ages 5-19 years), children and adolescents' growth and
33 development are influenced by their nutrition and environment at home, in the community and at
34 school⁷. Healthy growth and development at these ages helps consolidate gains and mitigate
35 inadequacies from early childhood, and vice versa,⁸⁻¹¹ with lifelong implications for health and
36 wellbeing. Until recently, growth and development of older children and adolescents received
37 substantially less attention than in early childhood and adulthood^{12,13}. Increasing policy attention
38 to health and nutrition during school years has been accompanied by a presumption that
39 differences in nutrition and environment lead to distinct, and generally less healthy, patterns of
40 growth and development in these ages in cities compared to their rural counterparts^{1,4,14-21}, even
41 though some empirical studies, in particular in the USA, have found that food quality and
42 nutrition are better in cities²²⁻²⁵.

43

44 Data on growth and developmental outcomes in school ages are needed, alongside data on
45 efficacy of specific interventions and policies, to select and prioritise policies and programmes
46 both for the increasing urban population and for children who continue to grow up in rural areas.
47 Consistent and comparable global data also help benchmark across countries and draw lessons
48 on good practice. Yet, globally there are far fewer data on growth trajectories in rural and urban
49 areas in these formative ages than for under-five children²⁶ or for adults²⁷. The available studies
50 have been in one country, at one point in time and/or in one sex and narrow age groups^{24,28-33};
51 the few studies³⁴⁻³⁶ that covered more than one country mostly focused on older girls, and used
52 at most a few dozen data sources and hence could not systematically measure long-term
53 trends. Consequently, many policies and programmes that aim to enhance healthy growth and
54 development in school ages focus narrowly, and somewhat generically, on specific features of

55 nutrition or the environment in either cities or rural areas¹⁻⁶, with little attention to similarities and
56 differences between relevant outcomes in these settings, nor to the heterogeneity of the urban-
57 rural difference across countries.

58

59 Here, we report on mean height and body-mass index (BMI) of school-aged children and
60 adolescents in rural and urban areas of 200 countries and territories from 1990 to 2020. Height
61 and BMI are anthropometric measures of growth and development that are influenced by the
62 quality of nutrition and healthiness of the living environment, and are highly predictive of health
63 and wellbeing throughout life in observational and Mendelian randomization studies³⁷⁻⁴¹. These
64 studies have shown that having low height and excessively low BMI increases the risk of
65 morbidity and mortality, and low height impairs cognitive development, and reduces educational
66 performance and work productivity in later life^{37,38,40}. Having high BMI in these ages increases
67 the lifelong risk of overweight and obesity and several non-communicable diseases, and might
68 contribute to poor educational outcomes^{39,41}.

69

70 We used 2,325 population-based studies that had measured height and weight in 71 million
71 participants in 194 countries (Extended Data Fig.1, Supplementary Table 2). We used these
72 data in a Bayesian hierarchical meta-regression model to estimate mean height and BMI of
73 children and adolescents aged 5-19 years by rural and urban place of residence, year and age
74 for 200 countries and territories. Details of data sources and statistical methods are provided in
75 Methods. Our results represent height and BMI for children and adolescents of the same age
76 over time, i.e., successive cohorts, in each country's rural and urban areas, and the difference
77 between the two. For presentation, we summarise the 15 age-specific estimates, for single
78 years of age from 5 through 19, through age standardisation which puts each country-year's
79 child and adolescent population on the same age distribution, and allows comparisons to be

80 made over time and across countries. We also show results, graphically and numerically, for
81 index ages of 5, 10, 15 and 19 years in Extended Data and Supplementary Materials.

82
83 In 1990, school-aged boys and girls who lived in cities had a height advantage (i.e., were taller)
84 compared to their rural counterparts, except in high-income countries where the urban height
85 advantage was either negligible (<1 cm for age-standardised mean height; posterior probability
86 (PP) for urban children being taller ranging from 0.51 to >0.99) or there was even a small rural
87 advantage (e.g., Belgium, Netherlands, and the UK) (PP for rural children being taller ranging
88 from 0.53 to >0.99 where there was a rural height advantage) (Fig. 1A and Extended Data Fig.
89 2). The largest height differences between cities and rural areas in 1990 occurred in some
90 countries in Latin America (e.g., Mexico, Guatemala, Panama and Peru), east and southeast
91 Asia (China, Indonesia and Vietnam), central and eastern Europe (Bulgaria, Hungary and
92 Romania), and sub-Saharan Africa (DR Congo and Rwanda). The urban height advantage in
93 boys and girls in the named countries ranged 2.5-5.0 cm and the PP of urban children being
94 taller than rural children was >0.99 (see Supplementary Table 3 for country-specific numerical
95 values of height in rural and urban areas, their difference, and the corresponding credible
96 intervals).

97
98 The urban-rural height gap in the late 20th century differed among low- and middle-income
99 countries based on how much children and adolescents in cities and rural areas had
100 approached versus fallen behind their peers in high-income countries, where there was little
101 difference in rural and urban height. In countries such as Bulgaria, Hungary and Romania,
102 urban children and adolescents' height approached that of high-income countries, whereas rural
103 children and adolescents still lagged behind, leading to a relatively large gap. In much of sub-
104 Saharan Africa and south Asia, the height of both urban and rural children and adolescents
105 lagged behind their peers in high-income countries, such that the urban-rural gap was relatively

106 small. In a third group of low- or middle-income countries that included Indonesia, Vietnam,
107 Panama, Peru, DR Congo and Rwanda, urban children were still shorter than in high-income
108 countries, while rural children lagged so far behind that the urban-rural gap became large.

109
110 By 2020, the urban height advantage in school ages became smaller in much of the world, and,
111 in many high-income western countries and some central European countries it disappeared or
112 reversed into a small (typically <1 cm) urban disadvantage (Fig. 1A, Extended Data Fig. 2 and
113 Extended Data Fig. 9). Countries with substantial convergence over these three decades were
114 in central and eastern Europe (e.g., Croatia), Latin America and the Caribbean (e.g., Argentina,
115 Brazil, Chile and Paraguay), east and southeast Asia (e.g., Taiwan), and for girls in central Asia
116 (e.g., Kazakhstan and Uzbekistan). The urban height advantage in the named countries
117 declined by ~1-2 cm from 1990 to 2020; the PP of urban-rural height difference having declined
118 ≥ 0.90 for named countries). In many other middle-income countries (e.g., China, Romania and
119 Vietnam), the urban-rural height gaps declined, but children and adolescents living in cities
120 remained taller than their rural counterparts (by 1.7-2.5 cm in the named countries for boys and
121 girls; PP of urban children being taller than rural children >0.99). The exception to this
122 convergence was for boys in most countries in sub-Saharan Africa and some countries in
123 Oceania, South Asia, and the region of central Asia, Middle East and north Africa, where the
124 urban height advantage slightly increased over these three decades. The largest increase in the
125 urban height advantage occurred in countries in East Africa such as Ethiopia (0.9 cm larger
126 height gap in 2020 than 1990; 95% credible interval (CrI) -0.9 to 2.9 and PP of increase = 0.93),
127 Rwanda (1.0, -0.7 to 3.0 and PP = 0.88), and Uganda (1.1, -0.6 to 3.1 and PP = 0.89). For girls
128 in many countries in sub-Saharan Africa and south Asia, the urban-rural gap remained largely
129 unchanged.

130

131 In middle-income and emerging economies (i.e., newly high-income and industrialised
132 countries) where rural children and adolescents' height converged to those in cities, successive
133 cohorts of rural children and adolescents outpaced their urban counterparts in becoming taller
134 and attained what urban children in the same countries had done decades earlier: growing to
135 heights closer to those seen in high-income countries (Fig. 2). Successive cohorts of rural
136 children and adolescents in sub-Saharan Africa did not experience the accelerated height gain
137 seen in rural areas of middle-income countries; and, in the case of boys, there was no gain, or
138 possibly even a decrease, in height, which in turn led to a persistence or even widening of the
139 urban-rural gap. As a result of these global trends, by 2020, the largest urban-rural height gaps
140 were seen in Andean and central Latin America (e.g., Bolivia, Panama and Peru), by up to 4.7
141 (4.0-5.5) cm for boys and 3.81 (3.3-4.3) cm for girls, and, especially for boys, in sub-Saharan
142 Africa (e.g., DR Congo, Ethiopia, Mozambique and Rwanda) by up to 4.2 (2.7-5.7) cm.

143
144 The urban-rural BMI difference was relatively small throughout these three decades: $<1.4 \text{ kg/m}^2$
145 in all countries and years, and $<1.1 \text{ kg/m}^2$ in all but nine countries, for age-standardised mean
146 BMI (Fig. 1B, Extended Data Fig. 3 and Extended Data Fig. 10). In 1990, the urban-rural BMI
147 gap was largest in sub-Saharan Africa (e.g., Ethiopia, Kenya and Malawi, South Africa and
148 Zimbabwe) and south Asia (e.g., Bangladesh and India), followed by parts of Latin America
149 (e.g., Mexico and Peru); the urban-rural BMI gap in the two sexes in the named countries
150 ranged from $0.4\text{-}1.2 \text{ kg/m}^2$ and the PP of urban children having higher BMI than rural children
151 ≥ 0.89 . At that time, girls and/or boys in rural areas of some of these countries had mean BMI
152 levels that were close to, and in some ages even below, the thresholds of being underweight
153 (i.e., $>1\text{SD}$ below the median of the WHO reference population^{42,43}).

154
155 From 1990 to 2020, the BMI of successive cohorts of both urban and rural children and
156 adolescents increased in all but a few high-income countries (e.g., Denmark, Italy and Spain)

157 (Fig. 3). There was heterogeneity in low- and middle-income countries in how much BMI
158 increased in cities versus rural areas. In the great majority of countries in sub-Saharan Africa
159 and south Asia, BMI of successive cohorts of children and adolescents increased more in rural
160 areas than in cities leading to a closing of the urban-rural difference; the reductions in the urban-
161 rural BMI gap ranged from 0.1 to 0.65 kg/m² for both girls and boys, and the PP of urban-rural
162 BMI difference declining from 1990 to 2020 ranged from 0.52 to 0.95. In both sub-Saharan
163 Africa and south Asia, these changes shifted the mean BMI of rural boys and girls out of the
164 range for being underweight; in many countries in sub-Saharan Africa this shift continued
165 beyond the median of the WHO reference population, and in some cases approached the
166 threshold for being overweight (i.e., >1SD above the median of the WHO reference population).
167 The opposite, i.e., a larger rise in urban BMI happened in most other low-and middle-income
168 countries, leading to a slightly larger urban BMI excess in 2020 than in 1990. High-income
169 countries and those in central and eastern Europe experienced a mix of increasing and
170 decreasing urban BMI excess but remained within a relatively small range (-0.3 to 0.6 kg/m² for
171 almost all countries) over the entire period of analysis; at the regional level the urban-rural BMI
172 difference changed by <0.25 kg/m² in these regions.

173
174 The urban height advantage was larger in boys than girls in most countries (Extended Data Fig.
175 7). Urban excess BMI was higher in boys in only about one half of countries; in the other half,
176 mostly in high-income western countries and those in sub-Saharan Africa, urban excess BMI
177 was higher in girls. The urban height advantage was slightly larger at five years of age than at
178 19 years of age in most low- and middle-income countries, especially for girls, but there was
179 little difference across ages in high-income regions and in central and eastern Europe
180 (Extended Data Fig. 4).

181

182 Since the introduction of modern sanitation in 19th century, cities provided substantial nutritional
183 and health advantages in high-income and subsequently low- and middle-income
184 countries^{25,44,45}. Our results show that, in the 21st century, during school ages these advantages
185 have disappeared in high-income countries and diminished in middle-income countries and
186 emerging economies in Asia, Latin America and the Caribbean, and parts of Middle East and
187 north Africa. Specifically, in countries of these regions, successive cohorts of school-aged
188 children and adolescents living in cities were outpaced by those in rural areas in terms of height
189 gain but gained slightly more weight, typically in the unhealthy range. This contrasted with the
190 world's poorest region, sub-Saharan Africa, where the urban height advantage persisted or
191 even expanded while rural mean BMI went beyond remedying underweight and surpassed the
192 median of the WHO reference population in 2020, hence consolidating the urban advantage.
193 South Asia had a mixed pattern of urban versus rural trends from 1990 to 2020, with children
194 and adolescents in rural areas gaining both more height and more weight for their height than
195 those in cities in. Importantly, our results also show that differences in height and BMI between
196 urban and rural populations within most countries are smaller than the differences across
197 countries, even those in the same region.

198
199 Long-term follow up studies have shown that children and adolescents do not achieve their
200 height potential without sufficient and diverse nutritious foods, or if they are exposed to repeated
201 or persistent infections which result in loss of nutrients^{37,46-48}. Studies with data on household
202 socioeconomic and environmental variables have indicated that these physiological
203 determinants of height are themselves affected by income, quality of the living environment, and
204 access to healthcare in rural as well as urban areas^{49,50}. This evidence indicates that, underlying
205 our finding on small urban-rural height differential in high-income countries may be a greater
206 abundance of nutritious foods, including some fortified foods, better healthcare, and greater
207 ability to finance programmes that promote healthy growth in countries with greater per-capita

208 income and better infrastructure. Variations across these countries in the urban-rural height gap
209 within this small range may be due to socioeconomic inequalities, poverty differentials and
210 differences in availability and cost of different foods between cities and rural areas, and whether
211 there are specific programmes that improve nutrition of disadvantaged rural and urban groups⁵¹⁻
212 ⁵³. The more striking changes in height in urban versus rural areas took place in middle-income
213 countries and emerging economies. Case studies in some countries where the of heights of
214 rural and urban children and adolescents converged show that the convergence was partly due
215 to using the growth in national income towards programmes and services that helped close
216 gaps in nutrition, sanitation and healthcare between different areas and social groups⁵⁴⁻⁵⁹. In
217 countries in central and eastern Europe, transition to a market economy and increases in trade
218 may have reduced disparity in access to, and seasonality of, healthy foods between urban and
219 rural areas⁶⁰, and partly underlie the convergence of height seen in our results. In contrast,
220 country case studies show that where economic growth was accompanied by large inequalities
221 in income, nutrition and/or services, the urban advantage persisted⁶¹⁻⁶⁷.

222
223 We also found that the urban-rural BMI gap, although dynamic, changed much less than the
224 BMI of either subgroup of the population, and less than commonly assumed when discussing
225 the role of cities in the obesity epidemic^{1,4,14,17,19,20}. Urban-rural BMI differences were especially
226 small in high-income countries, consistent with the evidence from a few countries that diets and
227 behaviours are affected more by household socioeconomic status than whether children and
228 adolescents live in cities or rural areas^{23,53,68-70}. Urban BMI excess increased slightly more in
229 middle-income countries in east and southeast Asia, Latin America and the Caribbean, and
230 Middle East and north Africa, a trend that was the opposite of the convergence in BMI of adults
231 in these same regions²⁷. Additional analysis of NCD-RisC data for young adults (20-29 and 30-
232 39 years) showed that the shift from a small divergent trend to convergence of BMI between
233 urban and rural areas happens in young adulthood (Extended Data Fig. 8), a period during

234 which there is substantial, but variable, weight gain among population subgroups⁷¹⁻⁷³. These
235 shifts in trends from adolescence to young adulthood might be a result of changes in diet and
236 energy expenditure that accompany changes in household structure, social and economic roles
237 and the living environment⁷⁴⁻⁸⁰.

238

239 The notable exception in the global trends was sub-Saharan Africa, where a stagnation or
240 reversal of height gain in rural areas led to persistence or widening of urban-rural height
241 differences, while the opposite happened for BMI. Case studies of specific countries have
242 indicated that unfavourable trends in nutrition in rural Africa, where the majority of the world's
243 poorest people live⁸¹, started from macroeconomic shocks in the late 20th century, and the
244 subsequent agriculture, trade and development policies that limited improvements in income
245 and services in rural Africa, which increased urban-rural income inequality, and emphasised
246 agricultural exports over local food security and diversity⁸²⁻⁸⁷. These macroeconomic factors in
247 turn led to less diverse diets, with higher caloric intake rather than shifting to protein- and
248 nutrient-rich foods (e.g., animal products, seafood, fruits and vegetables)⁸⁶⁻⁹⁴, while the slow
249 expansion of infrastructure and services in rural areas restricted improvements in other
250 determinants of healthy growth such as clean water and sanitation and health care^{94,95}.
251 Secondary factors underlying the observed trends in height and BMI in rural sub-Saharan Africa
252 may be changes in the age of puberty onset, which is influenced by weight gain during
253 childhood, and might affect height gain during the adolescent growth spurt and in late
254 adolescence^{96,97}, differential trends in survival beyond five years of age in rural and urban areas,
255 and possibly rural to urban migration.

256

257 Some researchers and international development organisations have argued that the
258 simultaneous rise, as a result of the COVID-19 pandemic and of the invasion of Ukraine, in
259 poverty and the cost of agricultural supplies like fertilisers and food, especially of nutrient-rich

260 foods, can hinder and set back the gains in growth and development throughout the world⁹⁸⁻¹⁰².
261 These setbacks may be particularly large in poor countries and population subgroups, both
262 those in rural areas who rely on food production and those in cities who purchase foods. These
263 groups, especially those in rural Africa, already face food insecurity^{91,103} and emerged in our
264 results as the most pronounced loci of suboptimal growth and development during school ages,
265 with potential long-term adverse consequences for health and wellbeing. As attention in global
266 health turns to older children and adolescents¹⁰⁴, there is a need for policies and programmes
267 that take into account patterns of growth and development in population subgroups. Our results
268 on growth and development outcomes in rural and urban areas of different countries, together
269 with the extant evidence on the role of poverty and poor infrastructure and services⁵⁰, indicate
270 that there is a need for social, economic and development policies that reduce poverty and
271 infrastructure inadequacies and inequalities across and within rural and urban areas^{105,106}.
272 Second, as these macro policies are implemented and with deteriorating global poverty and
273 food crises, based on the evidence from specific countries on the benefits of targeted nutrition
274 programmes and health and social services^{58,107-115}, there is an urgent need for programmes
275 that equalise nutrition, and health and social services for children and adolescents at home,
276 school and in the community.

277 **References**

278 1 World Health Organization. Report of the commission on ending childhood obesity.
279 (World Health Organization, Geneva, 2016).

280 2 World Health Organization. Population-based approaches to childhood obesity
281 prevention. Report No. 9789241504782, (World Health Organization, Geneva, 2012).

282 3 United Nations Children's Fund (UNICEF). Prevention of overweight and obesity in
283 children and adolescents: UNICEF programming guidance. (UNICEF, New York, 2019).

284 4 Pirgon, Ö. & Aslan, N. The Role of Urbanization in Childhood Obesity. *Journal of clinical
285 research in pediatric endocrinology* 7, 163-167, doi:10.4274/jcrpe.1984 (2015).

286 5 World Health Organization & Centre for Health Development. Hidden cities: unmasking
287 and overcoming health inequities in urban settings. Report No. 9241548037, (World Health
288 Organization, Geneva, 2010).

289 6 de Sa, T. H. et al. Urban design is key to healthy environments for all. *The Lancet Global
290 Health* 10, e786-e787, doi:10.1016/S2214-109X(22)00202-9 (2022).

291 7 Neufeld, L. M. et al. Food choice in transition: adolescent autonomy, agency, and the
292 food environment. *Lancet* 399, 185-197, doi:10.1016/S0140-6736(21)01687-1 (2022).

293 8 Norris, S. A. et al. Nutrition in adolescent growth and development. *Lancet* 399, 172-184,
294 doi:10.1016/S0140-6736(21)01590-7 (2022).

295 9 Prentice, A. M. et al. Critical windows for nutritional interventions against stunting.
296 *American Journal of Clinical Nutrition* 97, 911-918, doi:10.3945/ajcn.112.052332 (2013).

297 10 Georgiadis, A. & Penny, M. E. Child undernutrition: opportunities beyond the first 1000
298 days. *The Lancet Public Health* 2, e399, doi:10.1016/S2468-2667(17)30154-8 (2017).

299 11 Fink, G. & Rockers, P. C. Childhood growth, schooling, and cognitive development:
300 further evidence from the Young Lives study. *Am J Clin Nutr* 100, 182-188,
301 doi:10.3945/ajcn.113.080960 (2014).

302 12 Patton, G. C. et al. Nourishing our future: the Lancet Series on adolescent nutrition.
303 *Lancet* 399, 123-125, doi:10.1016/s0140-6736(21)02140-1 (2022).

304 13 NCD Risk Factor Collaboration (NCD-RisC). Height and body-mass index trajectories of
305 school-aged children and adolescents from 1985 to 2019 in 200 countries and territories: a
306 pooled analysis of 2181 population-based studies with 65 million participants. *Lancet* 396, 1511-
307 1524, doi:10.1016/s0140-6736(20)31859-6 (2020).

308 14 World Health Organization & U. N. Habitat. Global report on urban health: equitable
309 healthier cities for sustainable development. (World Health Organization, 2016).

310 15 World Health Organization. Healthy environments for healthy children: Key messages for
311 action. Report No. 924159988X, (World Health Organization, Geneva, 2010).

312 16 Smith, D. M. & Cummins, S. Obese Cities: How Our Environment Shapes Overweight.
313 *Geography Compass* 3, 518-535, doi:10.1111/j.1749-8198.2008.00198.x (2009).

314 17 Fraser, B. Latin America's urbanisation is boosting obesity. *Lancet* 365, 1995-1996,
315 doi:10.1016/s0140-6736(05)66679-2 (2005).

316 18 UNICEF. The state of the world's children 2012: children in an urban world. (New York,
317 2012).

318 19 Kirchengast, S. & Hagmann, D. "Obesity in the City" – urbanization, health risks and
319 rising obesity rates from the viewpoint of human biology and public health. *Human Biology and
320 Public Health* 2, doi:10.52905/hbph.v2.11 (2021).

321 20 Congdon, P. Obesity and Urban Environments. *International Journal of Environmental
322 Research and Public Health* 16, doi:10.3390/ijerph16030464 (2019).

323 21 Gong, P. et al. Urbanisation and health in China. *Lancet* 379, 843-852,
324 doi:10.1016/S0140-6736(11)61878-3 (2012).

325 22 Liese, A. D., Weis, K. E., Pluto, D., Smith, E. & Lawson, A. Food store types, availability,
326 and cost of foods in a rural environment. *Journal of the American Dietetic Association* 107,
327 1916-1923 (2007).

328 23 Davis, A. M., Bennett, K. J., Befort, C. & Nollen, N. Obesity and Related Health
329 Behaviors Among Urban and Rural Children in the United States: Data from the National Health
330 and Nutrition Examination Survey 2003–2004 and 2005–2006. *Journal of Pediatric Psychology*
331 36, 669-676, doi:10.1093/jpepsy/jsq117 (2011).

332 24 Tambalis, K. D., Panagiotakos, D. B. & Sidossis, L. S. Greek children living in rural areas
333 are heavier but fitter compared to their urban counterparts: a comparative, time-series (1997-
334 2008) analysis. *The Journal of Rural Health* 27, 270-277, doi:10.1111/j.1748-0361.2010.00346.x
335 (2011).

336 25 Krumdiek, C. L. The rural-to-urban malnutrition gradient: a key factor in the pathogenesis
337 of urban slums. *Jama* 215, 1652-1654 (1971).

338 26 Paciorek, C. J., Stevens, G. A., Finucane, M. M. & Ezzati, M. Children's height and
339 weight in rural and urban populations in low-income and middle-income countries: a systematic
340 analysis of population-representative data. *The Lancet Global Health* 1, e300-e309,
341 doi:10.1016/S2214-109X(13)70109-8 (2013).

342 27 NCD Risk Factor Collaboration (NCD-RisC). Rising rural body-mass index is the main
343 driver of the global obesity epidemic in adults. *Nature* 569, 260-264, doi:10.1038/s41586-019-
344 1171-x (2019).

345 28 Hosseini, M., Taslimi, S., Dinarvand, P., Jones, M. E. & Mohammad, K. Trends in
346 weights, heights, BMI and comparison of their differences in urban and rural areas for Iranian
347 children and adolescents 2-18-year-old between 1990-1991 and 1999. *Child Care Health Dev*
348 36, 858-867, doi:10.1111/j.1365-2214.2010.01140.x (2010).

349 29 Menon, P., Ruel, M. T. & Morris, S. S. Socio-economic Differentials in Child Stunting are
350 Consistently Larger in Urban than in Rural Areas. *Food and Nutrition Bulletin* 21, 282-289,
351 doi:10.1177/156482650002100306 (2000).

352 30 Patel, S. A., Narayan, K. M. V. & Cunningham, S. A. Unhealthy weight among children
353 and adults in India: Urbanicity and the crossover in underweight and overweight. *Annals of*
354 *Epidemiology* 25, 336-341, doi:10.1016/j.annepidem.2015.02.009 (2015).

355 31 Johnson, J. A. & Johnson, A. M. Urban-rural differences in childhood and adolescent
356 obesity in the United States: a systematic review and meta-analysis. *Childhood Obesity* 11, 233-
357 241, doi:10.1089/chi.2014.0085 (2015).

358 32 Bahk, J. & Khang, Y. H. Trends in childhood obesity and central adiposity between
359 1998-2001 and 2010-2012 according to household income and urbanity in Korea. *BMC Public*
360 *Health* 16, 18, doi:10.1186/s12889-015-2616-2 (2016).

361 33 Song, Y. et al. Secular trends of obesity prevalence in Chinese children from 1985 to
362 2010: urban-rural disparity. *Obesity* 23, 448-453, doi:10.1002/oby.20938 (2015).

363 34 Jaacks, L. M., Slining, M. M. & Popkin, B. M. Recent trends in the prevalence of under-
364 and overweight among adolescent girls in low- and middle-income countries. *Pediatr Obes* 10,
365 428-435, doi:10.1111/ijpo.12000 (2015).

366 35 Wang, Y., Monteiro, C. & Popkin, B. M. Trends of obesity and underweight in older
367 children and adolescents in the United States, Brazil, China, and Russia. *The American journal*
368 *of clinical nutrition* 75, 971-977 (2002).

369 36 Neuman, M., Kawachi, I., Gortmaker, S. & Subramanian, S. V. Urban-rural differences in
370 BMI in low- and middle-income countries: the role of socioeconomic status. *Am J Clin Nutr* 97,
371 428-436, doi:10.3945/ajcn.112.045997 (2013).

372 37 Tanner, J. M. Growth as a mirror of the condition of society: secular trends and class
373 distinctions. *Acta Paediatr Jpn* 29, 96-103, doi:10.1111/j.1442-200x.1987.tb00015.x (1987).

374 38 Strauss, J. & Thomas, D. Health, Nutrition, and Economic Development. *Journal of*
375 *Economic Literature* 36, 766-817 (1998).

376 39 Park, M. H., Falconer, C., Viner, R. M. & Kinra, S. The impact of childhood obesity on
377 morbidity and mortality in adulthood: a systematic review. *Obes Rev* 13, 985-1000,
378 doi:10.1111/j.1467-789X.2012.01015.x (2012).

379 40 Nüesch, E. et al. Adult height, coronary heart disease and stroke: a multi-locus
380 Mendelian randomization meta-analysis. *Int J Epidemiol* 45, 1927-1937, doi:10.1093/ije/dyv074
381 (2016).

382 41 Caird, J. et al. Does being overweight impede academic attainment? A systematic
383 review. *Health Education Journal* 73, 497-521, doi:10.1177/0017896913489289 (2014).

384 42 de Onis, M. et al. Development of a WHO growth reference for school-aged children and
385 adolescents. *Bull World Health Organ* 85, 660-667, doi:10.2471/blt.07.043497 (2007).

386 43 NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in body-mass index,
387 underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-
388 based measurement studies in 128.9 million children, adolescents, and adults. *Lancet* 390,
389 2627-2642, doi:10.1016/s0140-6736(17)32129-3 (2017).

390 44 Leon, D. A. Cities, urbanization and health. *Int J Epidemiol.* 37, 4-8,
391 doi:10.1093/ije/dym271 (2008).

392 45 Godfrey, R. & Julien, M. Urbanisation and health. *Clinical medicine (London, England)* 5,
393 137-141, doi:10.7861/clinmedicine.5-2-137 (2005).

394 46 Scrimshaw, N. S. & SanGiovanni, J. P. Synergism of nutrition, infection, and immunity:
395 an overview. *Am J Clin Nutr* 66, 464s-477s, doi:10.1093/ajcn/66.2.464S (1997).

396 47 Grasgruber, P., Sebera, M., Hrazdíra, E., Cacek, J. & Kalina, T. Major correlates of male
397 height: A study of 105 countries. *Economics & Human Biology* 21, 172-195,
398 doi:https://doi.org/10.1016/j.ehb.2016.01.005 (2016).

399 48 Hatton, T. J. How have Europeans grown so tall? *Oxford economic papers* 66, 349-372,
400 doi:10.1093/oep/gpt030 (2014).

401 49 Garrett, J. L. & Ruel, M. T. Are Determinants of Rural and Urban Food Security and
402 Nutritional Status Different? Some Insights from Mozambique. *World Development* 27, 1955-
403 1975, doi:https://doi.org/10.1016/S0305-750X(99)00091-1 (1999).

404 50 Smith, L. C., Ruel, M. T. & Ndiaye, A. Why Is Child Malnutrition Lower in Urban Than in
405 Rural Areas? Evidence from 36 Developing Countries. *World Development* 33, 1285-1305,
406 doi:10.1016/j.worlddev.2005.03.002 (2005).

407 51 Lundborg, P., Rooth, D.-O. & Alex-Petersen, J. Long-Term Effects of Childhood
408 Nutrition: Evidence from a School Lunch Reform. *The Review of Economic Studies* 89, 876-908,
409 doi:10.1093/restud/rdab028 (2022).

410 52 Graça, P., Gregório, M. J. & Freitas, M. G. A Decade of Food and Nutrition Policy in
411 Portugal (2010–2020). *Portuguese Journal of Public Health* 38, 94-118, doi:10.1159/000510566
412 (2020).

413 53 Conrad, D. & Capewell, S. Associations between deprivation and rates of childhood
414 overweight and obesity in England, 2007–2010: an ecological study. *BMJ Open* 2, e000463,
415 doi:10.1136/bmjopen-2011-000463 (2012).

416 54 Monteiro, C. A. et al. Narrowing socioeconomic inequality in child stunting: the Brazilian
417 experience, 1974-2007. *Bull World Health Organ* 88, 305-311, doi:10.2471/blt.09.069195
418 (2010).

419 55 Winichagoon, P. Thailand nutrition in transition: situation and challenges of maternal and
420 child nutrition. *Asia Pac J Clin Nutr* 22, 6-15, doi:10.6133/apjcn.2013.22.1.17 (2013).

421 56 Vial, I., Muchnik, E. & Kain, J. The evolution of Chile's main nutrition intervention
422 programmes. *Food and Nutrition Bulletin* 13, 1-9 (1991).

423 57 Paes-Sousa, R. & Vaitsman, J. The Zero Hunger and Brazil without Extreme Poverty
424 programs: a step forward in Brazilian social protection policy. *Cien Saude Colet* 19, 4351-4360,
425 doi:10.1590/1413-812320141911.08812014 (2014).

426 58 Torres, A. et al. Chile Crece Contigo: Implementation, results, and scaling-up lessons.
427 *Child Care Health Dev* 44, 4-11, doi:10.1111/cch.12519 (2018).

428 59 Núñez, J. & Pérez, G. The Escape from Malnutrition of Chilean Boys and Girls: Height-
429 for-Age Z Scores in Late XIX and XX Centuries. *International Journal of Environmental*
430 *Research and Public Health* 18, 10436 (2021).

431 60 Herrmann, R., Möser, A. & Weber, S. A. in *Zentrum für Internationale Entwicklungs- und*
432 *Umweltforschung (ZEU)* (Discussion Paper, Justus-Liebig-Universität Gießen, Giessen,
433 2009).

434 61 Thang, N. M. & Popkin, B. Child malnutrition in Vietnam and its transition in an era of
435 economic growth. *J Hum Nutr Diet* 16, 233-244, doi:10.1046/j.1365-277x.2003.00449.x (2003).

436 62 Liu, H., Rizzo, J. A. & Fang, H. Urban-rural disparities in child nutrition-related health
437 outcomes in China: The role of hukou policy. *BMC Public Health* 15, 1159, doi:10.1186/s12889-
438 015-2517-4 (2015).

439 63 Subramanyam, M. A., Kawachi, I., Berkman, L. F. & Subramanian, S. V. Socioeconomic
440 inequalities in childhood undernutrition in India: analyzing trends between 1992 and 2005. *PLoS*
441 *one* 5, e11392, doi:https://dx.doi.org/10.1371/journal.pone.0011392 (2010).

442 64 Chen, Y., Luo, P. & Chang, T. Urbanization and the Urban–Rural Income Gap in China:
443 A Continuous Wavelet Coherency Analysis. *Sustainability* 12, 8261 (2020).

444 65 Oxfam. *Participatory Poverty Monitoring in Rural Communities in Vietnam*. (London,
445 2010).

446 66 Jingzhong, Y. & Lu, P. Differentiated childhoods: impacts of rural labor migration on left-
447 behind children in China. *The Journal of Peasant Studies* 38, 355-377,
448 doi:10.1080/03066150.2011.559012 (2011).

449 67 He, L. & Zhang, X. The distribution effect of urbanization: Theoretical deduction and
450 evidence from China. *Habitat International* 123, 102544,
451 doi:https://doi.org/10.1016/j.habitatint.2022.102544 (2022).

452 68 Kelly, C., Callaghan, M., Molcho, M., Nic Gabhainn, S. & Alforque Thomas, A. Food
453 environments in and around post-primary schools in Ireland: Associations with youth dietary
454 habits. *Appetite* 132, 182-189, doi:10.1016/j.appet.2018.08.021 (2019).

455 69 Euler, R. et al. Rural–urban differences in baseline dietary intake and physical activity
456 levels of adolescents. *Preventing Chronic Disease* 16 (2019).

457 70 Moreno-Llamas, A., García-Mayor, J. & De la Cruz-Sánchez, E. Urban-rural differences
458 in trajectories of physical activity in Europe from 2002 to 2017. *Health Place* 69, 102570,
459 doi:10.1016/j.healthplace.2021.102570 (2021).

460 71 Johnson, W., Li, L., Kuh, D. & Hardy, R. How Has the Age-Related Process of
461 Overweight or Obesity Development Changed over Time? Co-ordinated Analyses of Individual
462 Participant Data from Five United Kingdom Birth Cohorts. *PLOS Medicine* 12, e1001828,
463 doi:10.1371/journal.pmed.1001828 (2015).

464 72 Norris, T. et al. Changes over time in latent patterns of childhood-to-adulthood BMI
465 development in Great Britain: evidence from three cohorts born in 1946, 1958, and 1970. *BMC*
466 *Medicine* 19, 96, doi:10.1186/s12916-021-01969-8 (2021).

467 73 Katsoulis, M. et al. Identifying adults at high-risk for change in weight and BMI in
468 England: a longitudinal, large-scale, population-based cohort study using electronic health
469 records. *The Lancet Diabetes & Endocrinology*, 681-694, doi:10.1016/S2213-8587(21)00207-2
470 (2021).

471 74 Arnett, J. J. Emerging Adulthood: A Theory of Development From the Late Teens
472 Through the Twenties. *The American psychologist* 55, 469-480, doi:10.1037/0003-
473 066X.55.5.469 (2000).

474 75 Beasley, L. J., Hackett, A. F. & Maxwell, S. M. The dietary and health behaviour of
475 young people aged 18–25 years living independently or in the family home in Liverpool, UK.
476 *International Journal of Consumer Studies* 28, 355-363, doi:https://doi.org/10.1111/j.1470-
477 6431.2004.00394.x (2004).

478 76 Ihara, M. et al. A cross-sectional study of the association between city scale and daily
479 steps in Japan: Data from the National Health and Nutrition Survey Japan (NHNS-J) 2006-2010.
480 *Nihon Koshu Eisei Zasshi* 63, 549-559, doi:10.11236/jph.63.9_549 (2016).

481 77 Poobalan, A. S., Aucott, L. S., Clarke, A. & Smith, W. C. S. Diet behaviour among young
482 people in transition to adulthood (18-25 year olds): a mixed method study. *Health psychology*
483 and *behavioral medicine* 2, 909-928, doi:10.1080/21642850.2014.931232 (2014).

484 78 Patterson, K. A. et al. Accumulated exposure to rural areas of residence over the life
485 course is associated with overweight and obesity in adulthood: a 25-year prospective cohort
486 study. *Ann Epidemiol* 27, 169-175.e162, doi:10.1016/j.annepidem.2017.01.007 (2017).

487 79 Winpenny, E. M. et al. Changes in diet through adolescence and early adulthood:
488 longitudinal trajectories and association with key life transitions. *Int J Behav Nutr Phys Act* 15,
489 86, doi:10.1186/s12966-018-0719-8 (2018).

490 80 Harker, D., Sharma, B., Harker, M. & Reinhard, K. Leaving home: Food choice behavior
491 of young German adults. *Journal of Business Research* 63, 111-115,
492 doi:https://doi.org/10.1016/j.jbusres.2009.02.007 (2010).

493 81 World Bank. Poverty and shared prosperity 2020: Reversals of fortune. Report No.
494 1464816026, (The World Bank, Washington, DC, 2020).

495 82 Pongou, R., Salomon, J. A. & Ezzati, M. Health impacts of macroeconomic crises and
496 policies: determinants of variation in childhood malnutrition trends in Cameroon. *International*
497 *Journal of Epidemiology* 35, 648-656, doi:10.1093/ije/dyl016 (2006).

498 83 Sundberg, S. Agriculture, poverty and growth in Africa: Linkages and policy challenges.
499 *Cab Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources*
500 4, doi:10.1079/PAVSNNR20094005 (2009).

501 84 Jonah, C. M. P., Sambu, W. C. & May, J. D. A comparative analysis of socioeconomic
502 inequities in stunting: a case of three middle-income African countries. *Archives of Public Health*
503 76, 77, doi:10.1186/s13690-018-0320-2 (2018).

504 85 Sulemana, I., Nketiah-Amponsah, E., Codjoe, E. A. & Andoh, J. A. N. Urbanization and
505 income inequality in sub-Saharan Africa. *Sustainable Cities and Society* 48, 101544,
506 doi:https://doi.org/10.1016/j.scs.2019.101544 (2019).

507 86 Weatherspoon, D. D., Miller, S., Ngabitsinze, J. C., Weatherspoon, L. J. & Oehmke, J. F.
508 Stunting, food security, markets and food policy in Rwanda. *BMC Public Health* 19, 882,
509 doi:10.1186/s12889-019-7208-0 (2019).

510 87 Kray, H. A., Heumesser, C., Mikulcak, F., Giertz, Å. & Bucik, M. Productive
511 Diversification in African Agriculture and its Effects on Resilience and Nutrition. (The World
512 Bank, 2018).

513 88 Bentham, J. et al. Multidimensional characterization of global food supply from 1961 to
514 2013. *Nature Food* 1, 70-75, doi:10.1038/s43016-019-0012-2 (2020).

515 89 Wolmarans, P. Background paper on global trends in food production, intake and
516 composition. *Ann Nutr Metab* 55, 244-272, doi:10.1159/000229005 (2009).

517 90 Micha, R. et al. Global, regional and national consumption of major food groups in 1990
518 and 2010: a systematic analysis including 266 country-specific nutrition surveys worldwide. *BMJ*
519 *Open* 5, e008705, doi:10.1136/bmjopen-2015-008705 (2015).

520 91 Fraval, S. et al. Food Access Deficiencies in sub-Saharan Africa: Prevalence and
521 Implications for Agricultural Interventions. *Frontiers in Sustainable Food Systems* 3,
522 doi:10.3389/fsufs.2019.00104 (2019).

523 92 Godha, D., Zafimanjaka, M., Bambara, E., Likhite, N. & Tharaney, M. Determinants of
524 adolescent nutritional status and practices in Burkina Faso: A pooled secondary analysis. *Field*
525 *Exchange* 66, 68 (2021).

526 93 Cockx, L., Colen, L., De Weerd, J., Gomez Y Paloma, S. Urbanization as a driver of
527 changing food demand in Africa: Evidence from rural-urban migration in Tanzania.
528 (Publications Office of the European Union, 2019).

529 94 Food and Agriculture Organization. FAOSTAT, <<https://www.fao.org/faostat>> (2022).

530 95 Thomson, M., Kentikelenis, A. & Stubbs, T. Structural adjustment programmes adversely affect vulnerable populations: a systematic-narrative review of their effect on child and maternal health. *Public Health Reviews* 38, 13, doi:10.1186/s40985-017-0059-2 (2017).

531

532

533 96 Frisch, R. E. & Revelle, R. Height and Weight at Menarche and a Hypothesis of Critical Body Weights and Adolescent Events. *Science* 169, 397-399, doi:doi:10.1126/science.169.3943.397 (1970).

534

535

536 97 Holmgren, A. et al. Pubertal height gain is inversely related to peak BMI in childhood. *Pediatric Research* 81, 448-454, doi:10.1038/pr.2016.253 (2017).

537

538 98 Laborde, D., Herforth, A., Headey, D. & de Pee, S. COVID-19 pandemic leads to greater depth of unaffordability of healthy and nutrient-adequate diets in low- and middle-income countries. *Nature Food* 2, 473-475, doi:10.1038/s43016-021-00323-8 (2021).

539

540

541 99 Osendarp, S. et al. Act now before Ukraine war plunges millions into malnutrition, <<https://www.nature.com/articles/d41586-022-01076-5>> (2022).

542

543 100 Oxfam. First Crisis Then Catastrophe [Press release], <<https://www.oxfamamerica.org/explore/research-publications/first-crisis-then-catastrophe/>> (2022).

544

545

546 101 Glauber, J. L., David. How will Russia's invasion of Ukraine affect global food security?, <<https://www.ifpri.org/blog/how-will-russias-invasion-ukraine-affect-global-food-security>> (2022).

547

548 102 World Food Programme. Food security implications of the Ukraine conflict [Factsheet]. doi:<https://www.wfp.org/publications/food-security-implications-ukraine-conflict> (2022).

549

550 103 FSIN and Global Network Against Food Crises. Global Report on Food Crises. (Rome, 2021).

551

552 104 Black, R. E. et al. Health and development from preconception to 20 years of age and human capital. *Lancet* 399, 1730-1740, doi:[https://doi.org/10.1016/S0140-6736\(21\)02533-2](https://doi.org/10.1016/S0140-6736(21)02533-2) (2022).

553

554

555 105 Pandey, V. L., Mahendra Dev, S. & Jayachandran, U. Impact of agricultural interventions on the nutritional status in South Asia: A review. *Food Policy* 62, 28-40, doi:<https://doi.org/10.1016/j.foodpol.2016.05.002> (2016).

556

557

558 106 Manley, J., Alderman, H. & Gentilini, U. More evidence on cash transfers and child nutritional outcomes: a systematic review and meta-analysis. *BMJ Global Health* 7, e008233, doi:10.1136/bmjgh-2021-008233 (2022).

559

560

561 107 Alderman, H. & Bundy, D. School feeding programs and development: are we framing the question correctly? *The World Bank Research Observer* 27, 204-221 (2012).

562

563 108 Fang, G. & Zhu, Y. Long-term impacts of school nutrition: Evidence from China's school meal reform. *World Development* 153, 105854, doi:<https://doi.org/10.1016/j.worlddev.2022.105854> (2022).

564

565

566 109 Gundersen, C., Kreider, B. & Pepper, J. The impact of the National School Lunch Program on child health: A nonparametric bounds analysis. *Journal of Econometrics* 166, 79-91, doi:<https://doi.org/10.1016/j.jeconom.2011.06.007> (2012).

567

568

569 110 Kruk, M. E. et al. Improving health and social systems for all children in LMICs: structural innovations to deliver high-quality services. *Lancet*, doi:10.1016/s0140-6736(21)02532-0 (2022).

570

571 111 Ahmed, M. & Lorica, M. H. Improving developing country food security through aquaculture development—lessons from Asia. *Food Policy* 27, 125-141, doi:[https://doi.org/10.1016/S0306-9192\(02\)00007-6](https://doi.org/10.1016/S0306-9192(02)00007-6) (2002).

572

573

574 112 Omidvar, N., Babashahi, M., Abdollahi, Z. & Al-Jawaldeh, A. Enabling Food Environment in Kindergartens and Schools in Iran for Promoting Healthy Diet: Is It on the Right Track? *International Journal of Environmental Research and Public Health* 18, doi:10.3390/ijerph18084114 (2021).

575

576

577

578 113 Ruel, M. T. & Alderman, H. Nutrition-sensitive interventions and programmes: how can
579 they help to accelerate progress in improving maternal and child nutrition? *The Lancet* 382, 536-
580 551, doi:10.1016/S0140-6736(13)60843-0 (2013).
581 114 Tandon, B. N. Nutritional interventions through primary health care: impact of the ICDS
582 projects in India. *Bull World Health Organ* 67, 77-80 (1989).
583 115 Bhutta, Z. A. et al. How countries can reduce child stunting at scale: lessons from
584 exemplar countries. *The American Journal of Clinical Nutrition* 112, 894S-904S,
585 doi:10.1093/ajcn/nqaa153 (2020).
586

587 **Methods**

588 We estimated trends in mean height and BMI for children aged 5-19 years from 1990 to 2020 by
589 rural and urban place of residence for 200 countries and territories listed in Supplementary
590 Table 1. We pooled, in a Bayesian meta-regression, repeated cross-sectional population-based
591 data on height and BMI. Our results represent estimates of height and BMI for children and
592 adolescents of the same age over time, i.e., for successive cohorts, in each country's rural and
593 urban settings.

594

595 **Data sources**

596 We used a database on cardiometabolic risk factors collated by the Non-Communicable
597 Disease Risk Factor Collaboration (NCD-RisC). Data were obtained from publicly available
598 multi-country and national measurement surveys (e.g., Demographic and Health Surveys
599 (DHS), WHO-STEPwise approach to Surveillance (STEPS) surveys, and those identified via the
600 Inter-University Consortium for Political and Social Research, UK Data Service, and European
601 Health Interview & Health Examination Surveys Database). With the help of World Health
602 Organization (WHO) and its regional and country offices as well as World Heart Federation, we
603 identified and accessed population-based survey data from national health and statistical
604 agencies. We searched and reviewed published studies as detailed previously¹¹⁶ and invited
605 eligible studies to join NCD-RisC, as did we with data holders from earlier pooled analyses of
606 cardiometabolic risk factors¹¹⁷⁻¹²⁰. The NCD-RisC database is continuously updated through all
607 the above routes and periodic requests to NCD-RisC members to suggest additional sources in
608 their countries.

609

610 We carefully checked that each data source met our inclusion criteria, as listed below. Potential
611 duplicate data sources were first identified by comparing studies from the same country and
612 year, followed by checking with NCD-RisC members that had provided data about whether the

613 sources from the same country and year were the same or distinct. If two sources were
614 confirmed as duplicates, one was discarded. All NCD-RisC members were also periodically
615 asked to review the list of sources from their country, to verify that the included data meet the
616 inclusion criteria and are not duplicates.

617
618 For each data source, we recorded the study population, sampling approach, years of
619 measurement, and measurement methods. Only data that were representative of the population
620 were included. All data sources were assessed in terms of whether they covered the whole
621 country, multiple subnational regions (i.e., one or more subnational regions/provinces/states,
622 more than three cities or more than five rural communities), or one or a small number of
623 communities (limited geographical scope not meeting above national or subnational criteria),
624 and whether participants in rural, urban or both areas were included. As stated in the sections
625 on statistical model, these study-level attributes were used in the Bayesian hierarchical model to
626 estimate mean height and BMI by country, year, sex, age and place of residence using all
627 available data while taking into account differences in the populations from which different
628 studies had sampled. All submitted data were checked by at least two independent persons.
629 Questions and clarifications were discussed with NCD-RisC members and resolved before data
630 were incorporated in the database.

631
632 Anonymised individual data from the studies in the NCD-RisC database were reanalysed
633 according to a common protocol. We calculated mean height and mean BMI, and the
634 associated standard errors, by sex, single year of age from five to 19 years, and rural or urban
635 place of residence. Additionally, for analysis of height, participants aged 20-30 years were
636 included, assigned to their corresponding birth cohort, because mean height in these ages
637 would be at least that when they were aged 19 years, given that the decline of height with age
638 begins in the third and fourth decades of life¹²¹. All analyses incorporated sample weights and

639 complex survey design, when applicable, in calculating summary statistics. For studies that had
640 used simple random sampling, we calculated mean as average of all individuals within the
641 group and their associated standard errors (standard deviation divided by the square root of
642 sample size); for studies that had used multistage (stratified) sampling, we accounted for survey
643 design features including clusters, strata and sample weights, to weight each observation by the
644 inverse sampling probability and estimate standard error via Taylor series linearisation, as
645 implemented in the R 'survey' package¹²². Computer code was provided to NCD-RisC members
646 who requested assistance. For surveys without information on place of residence, we calculated
647 age- and sex-stratified summary statistics for the entire sample, which represented the
648 population-weighted sum of rural and urban means; data on the share of population in urban
649 versus rural areas were from the United Nations Population Division¹²³.

650
651 Additionally, summary statistics for nationally representative data from sources that were
652 identified but not accessed via the above routes were extracted from published reports. Data
653 were also extracted for two STEPS surveys that were not publicly available. We also included
654 data from a previous global-data pooling study¹²⁰, when not accessed through the above routes.

656 **Data inclusion and exclusion**

657 Data sources were included in the NCD-RisC height and weight database if:

- 658 • measured data on height and weight were available;
- 659 • study participants were five years of age and older;
- 660 • data were collected using a probabilistic sampling method with a defined sampling frame;
- 661 • data were from population samples at the national, subnational, or community level as
662 defined above; and
- 663 • data were from the countries and territories listed in Supplementary Table 1.

664

665 We excluded all data sources that were solely based on self-reported weight and height without
666 a measurement component because these data are subject to biases that vary by geography,
667 time, age, sex and socioeconomic characteristics¹²⁴⁻¹²⁶. Due to these variations, approaches to
668 correcting self-reported data may leave residual bias. We also excluded data sources on
669 population subgroups whose anthropometric status may differ systematically from the general
670 population, including:

- 671 • studies that had included or excluded people based on their health status or cardiovascular
672 risk;
- 673 • studies whose participants were only ethnic minorities;
- 674 • specific educational, occupational, or socioeconomic subgroups, with the exception noted
675 below;
- 676 • those recruited through health facilities, with the exception noted below; and
- 677 • females aged 15-19 years in surveys which sampled only ever-married women or measured
678 height and weight only among mothers.

679

680 We used school-based data in countries and age-sex groups with school enrolment of 70% or
681 higher. We used data whose sampling frame was health insurance schemes in countries where
682 at least 80% of the population were insured. Finally, we used data collected through general
683 practice and primary care systems in high-income and central European countries with universal
684 insurance, because contact with the primary care systems tends to be as good as or better than
685 response rates for population-based surveys.

686

687 We excluded <0.01% of all participants whose age was <18 years and whose data not reported
688 by single year of age because height and weight may have non-linear age associations in these

689 ages, especially during growth spurts. We excluded BMI data for females who were pregnant at
690 the time of measurement (<0.01% of all participants). We excluded <0.2% of all participants
691 who had recorded height outside the range <60 cm or >180 cm for ages <10 years; <80 cm or
692 >200 cm for ages 10-14 years; <100 cm or >250 cm for ages ≥ 15 years, recorded weight
693 outside the range <5 kg or >90 kg for age <10 years; <8 kg or >150 kg for ages 10-14 years;
694 <12 kg or >300 kg for ages ≥ 15 years, or recorded BMI outside the range <6 kg/m² or >40 kg/m²
695 for ages < 10 years; <8 kg/m² or >60 kg/m² for ages 10-14 years; <10 kg/m² or >80 kg/m² for
696 ages ≥ 15 years.

697

698 **Conversion of BMI prevalence metrics to mean BMI**

699 In 0.5% of our data points mostly extracted from published reports or from a previous pooling
700 analysis¹²⁰, mean BMI was not reported, but data were available for the prevalence of one or
701 more BMI categories, for example, BMI ≥ 30 kg/m². In order to use these data, we used
702 previously validated conversion regressions⁴³ to estimate the missing primary outcome from the
703 available BMI prevalence metric(s). Additional details on regression model specifications along
704 with the regression coefficients are reported on <https://github.com/NCD-RisC/ncdrisc-methods/>.

705

706 **Statistical model overview**

707 We used a Bayesian hierarchical meta-regression model to estimate mean height and BMI by
708 country, year, sex, age and place of residence using the aforementioned data. For presentation,
709 we summarised the 15 age-specific estimates, for single years of age from 5 through 19,
710 through age standardisation which puts each country-year's child and adolescent population on
711 the same age distribution, and hence allows comparisons to be made over time and across
712 countries. We generated age-standardised estimates by taking weighted means of age-specific
713 estimates, using age weights from the WHO standard population¹²⁷. We also show results,

714 graphically and numerically, for index ages of 5, 10, 15 and 19 years in Extended Data and
715 Supplementary Materials.

716
717 The statistical model is described in detail in statistical papers^{128,129}, related substantive
718 papers^{13,26,27,43,117-120,130} and in the section below on model specification. In summary, the model
719 had a hierarchical structure in which estimates for each country and year were informed by its
720 own data, if available, and by data from other years in the same country and from other
721 countries, especially those in the same region and super-region, with data for similar time
722 periods. The extent to which estimates for each country-year were influenced by data from other
723 years and other countries depended on whether the country had data, the sample size of the
724 data, whether they were national, and the within-country and within-region variability of the
725 available data. For the purpose of hierarchical analysis, countries were organised into 21
726 regions, mostly based on geography and national income (Supplementary Table 1). Regions
727 were in turn organised into nine super-regions.

728
729 We used observation year, i.e., the year in which data were collected, as the time-scale for the
730 analysis of BMI and birth year as the time scale for the analysis of height, consistent with
731 previous
732 analyses^{13,43,131}. Time trends were modelled through a combination of a linear term, to capture
733 gradual long-term change, and a second-order random walk, which allows for non-linear
734 trends¹³², both modelled hierarchically. The age associations of height and BMI were modelled,
735 using cubic splines, to allow non-linear changes over age, including periods of rapid as well as
736 slow rise.. Periods of rapid rise represent adolescent growth spurts, which occur earlier in girls
737 than boys^{42,133,134}, was reflected in placement of spline knots for boys and girls, respectively, as
738 detailed in the section on model specification. Spline coefficients were allowed to vary across

739 countries, based on their own data as well as in a hierarchical structure, as previously
740 described¹³⁰.

741
742 The model also accounted for the possibility that height or BMI in subnational and community
743 samples might differ systematically from nationally representative samples and have larger
744 variation than in national studies. These features were accounted for through the inclusion of
745 fixed-effect and random-effect terms for subnational and community data as detailed in the
746 model specification section below. The fixed effects accounted for systematic differences
747 between subnational or community studies and national studies. The inclusion of random effects
748 allowed national data to have greater influence on the estimates than subnational or community
749 data with similar sample sizes, because the subnational and community data have additional
750 variance from the random effect terms. Both were estimated empirically as a part of model
751 fitting.

752
753 Following the approach of previous papers^{26,27,128}, the model included parameters representing
754 the urban-rural height or BMI difference, which is empirically estimated and allowed to vary by
755 country, year, and age. We further expanded the model to allow urban-rural difference in height
756 or BMI to vary by age, as height or weight with age may vary between rural versus urban
757 children. If data for a country-year-age group contained mixed urban and rural children, but
758 were not stratified by place of residence (21% of all data sources), the estimated BMI difference
759 was informed by stratified data from other age groups, years and countries, especially those in
760 the same region with data from similar time periods and/or ages.

761
762 **Statistical model specification**

763 As stated earlier, for each data source, we calculated mean height and BMI, together with
764 corresponding standard errors, stratified by sex, age and rural or urban place of residence. For

765 sources that did not stratify the sample on the place of residence, we obtained age-and-sex-
766 stratified data. Each study contributed up to 30 mean BMI data points or 32 mean height data
767 points for each sex with the exact number depending how many age groups were represented
768 in the study, and whether or not the study provided data stratified on urban and rural place of
769 residence. The likelihood for an observation at urbanicity level s (urban-only, rural-only or
770 mixed; referred to as stratum hereinafter) and age group h , with age z , from study i , carried out
771 in country j at time t is:

$$y_{s,h,i} \sim N(a_{j[t]} + b_{j[t]}t_i + u_{j[t],t_i} + \gamma_i(z_h) + \mathbf{X}_i\boldsymbol{\beta} + e_i + I_{s,i}[p_{j[t]} + q_{j[t]}t_i + r_{j[t]}z_h + d_i], SD_{s,h,i}^2/n_{s,h,i} + \tau_i^2)$$

772
773 where the country-specific intercept and linear time slope from the j^{th} country ($j = 1 \dots J$, where J
774 = 200 which is the total number of countries in our analysis) are denoted a_j and b_j , respectively.
775 We describe the hierarchical model used for the a 's and b 's in *Linear components of country*
776 *time trends* section. Letting $T = 31$ be the total number of years from 1990 to 2020, the T -vector
777 u_j captures smooth non-linear change over time in country j , as described in *Non-linear change*
778 section. The age effects of the h^{th} age group (with age z) in study i are denoted by γ_i ; we
779 describe the age model in *Age model* section. The matrix \mathbf{X} contains terms describing whether
780 studies were representative at the national, sub-national or community level. In addition, a
781 random effect, e_i , is estimated for each study, described in *Study-level term and study-specific*
782 *random effects* section.

783

784 *Linear components of country time trends*

785 The model had a hierarchical structure: studies were nested in countries, which were nested in
786 regions (indexed by k), which were nested in super-regions (indexed by l), which were, of
787 course, all nested in the globe (see Supplementary Table 1 for list of countries in each region,
788 and regions in each super-region). This structure allowed the model to share information across

789 units to a greater degree when data were non-existent or weakly informative (e.g., have a small
 790 sample size or were not nationally representative), and to a lesser extent in data-rich countries
 791 and regions¹³⁵.

792

793 The a and b terms are country-specific linear intercepts and time slopes with terms at each level
 794 of the hierarchy, denoted by the superscripts c, r, s , and g , respectively:

$$a_j = a_j^c + a_{k[j]}^r + a_{l[k]}^s + a^g$$

$$b_j = b_j^c + b_{k[j]}^r + b_{l[k]}^s + b^g$$

$$a_j^x \sim N(0, \kappa_a^x)$$

$$795 \quad b_j^x \sim N(0, \kappa_b^x) \text{ (where } x = \{c, r, s\})$$

796

797 The κ terms are each assigned a flat prior on the standard deviation scale¹³⁶. We also assigned
 798 flat priors to a^g and b^g .

799

800 *Non-linear change*

801 Mean BMI or height may change non-linearly over time^{13,43,116,120,131}. We captured smooth non-
 802 linear change in time in urban and rural strata of country j using the vector u_j . Just as a_j and b_j
 803 are each defined as the sum of country, region, super-region, and global components, we
 804 defined:

$$u_j = u_j^c + u_{k[j]}^r + u_{l[k]}^s + u^g$$

805

806 In order to allow the model to differentiate between the degrees of non-linearity that exist at the
 807 country, region, super-region, and global levels, we assigned each of the u 's four components a
 808 Gaussian autoregressive prior as in Breslow and Clayton¹³⁷ and Rue and Held¹³². In particular,
 809 the T -vectors u_j^c ($j = 1 \dots J$), u_k^r ($k = 1 \dots K$), u_l^s ($l = 1 \dots L$), and u^g each have a normal prior

810 with mean zero and precision $\lambda_c P$, $\lambda_r P$, $\lambda_s P$, and $\lambda_g P$ respectively, where the scaled precision
 811 matrix P in the Gaussian autoregressive prior penalizes first and second differences:

$$\begin{aligned}
 P &= \begin{bmatrix} 1 & 0 & 0 & \dots & 0 \\ -2 & 1 & 0 & \dots & 0 \\ 1 & -2 & 1 & \dots & 0 \\ 0 & 1 & -2 & \dots & 0 \\ 0 & 0 & 1 & \dots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \dots & 1 \end{bmatrix} \begin{bmatrix} 1 & -2 & 1 & 0 & 0 & \dots & 0 \\ 0 & 1 & -2 & 1 & 0 & \dots & 0 \\ 0 & 0 & 1 & -2 & 1 & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & 0 & 0 & \dots & 1 \end{bmatrix} \\
 &= \begin{bmatrix} 1 & -2 & 1 & 0 & 0 & \dots & 0 \\ -2 & 5 & -4 & 1 & 0 & \dots & 0 \\ 1 & -4 & 6 & -4 & 1 & \dots & 0 \\ 0 & 1 & -4 & 6 & -4 & \dots & 0 \\ 0 & 0 & 1 & -4 & 6 & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & 0 & 0 & \dots & 1 \end{bmatrix}.
 \end{aligned}$$

812
 813 P is multiplied by the estimated precision parameters λ_c , λ_r , λ_s , and λ_g , thus up-weighting or
 814 down-weighting the strength of its penalties and ultimately determining the degree of smoothing
 815 at each level. For each of the four precision parameters, we used a truncated flat prior on the
 816 standard deviation scale ($1/\sqrt{\lambda}$) as recommended by Gelman¹³⁶. We truncated these priors such
 817 that $\log \lambda \leq 20$ for each of the four λ 's. This upper bound is enforced as a computational
 818 convenience: models with $\log \lambda > 20$ are treated as equivalent to a model with $\log \lambda = 20$ as they
 819 essentially have no extra-linear variability in time. In practice, this upper bound had little effect
 820 on the parameter estimates. Furthermore, we order the λ 's a priori: $\lambda_c < \lambda_r < \lambda_s < \lambda_g$. This prior
 821 constraint conveys the natural expectation that, for example, the global BMI trend has less
 822 extra-linear variability than the trend of any given region.

823

824 The matrix P has rank $T - 2$, corresponding to a flat, improper prior on the mean and the slope
 825 of the u_j^c 's, the u_k^r 's, the u_l^s 's and of u^g , and is not invertible¹³⁸ Thus, we have a proper prior in a
 826 reduced-dimension space as discussed in Rue and Held¹³², with the prior expressed as:

$$P(u_j^c | \lambda_c) \propto \lambda_c^{\frac{T-2}{2}} \exp\left\{-\frac{\lambda_c}{2} u_j^{c'} P u_j^c\right\}$$

827
 828 Note that if u_j^c had a non-zero mean, this would introduce non-identifiability with respect to a_j^c .
 829 By the same token, b_j^c would not be identified if u_j had a non-zero time slope, and similarly for
 830 the other means and slopes. Thus, in order to achieve identifiability of the a 's, b 's, and u 's, we
 831 constrained the mean and slope of u^g and of each u^s , u^r , and u^c to be zero. Enforcing
 832 orthogonality between the linear and non-linear portions of the time trends means that each can
 833 be interpreted independently.

834
 835 In cases where we have observations for at least two different time points, this improper prior
 836 will not lead to an improper posterior since the data will provide information about the mean and
 837 slope. However, to enforce the desired orthogonality between the linear and non-linear portions
 838 of the model, we constrained the mean and slope of the u_j^c 's, u_k^r 's, u_l^s 's, and of u^g to be zero,
 839 using the approach described by Rue and Held¹³².

840
 841 For the six countries with no height data, and seven countries with no BMI data, we took the
 842 Moore-Penrose pseudoinverse of P ¹³⁹, setting to infinity those eigenvalues that correspond to
 843 the non-identifiability. This effectively constrains the non-identified portions of the model to zero,
 844 as the corresponding variances are set to zero¹³⁷; in this case the Rue and Held correction¹³² is
 845 not needed. An intermediate case occurs when data are observed for only one time point in a
 846 country. In this case, the full conditional precision has rank $T - 1$ because the mean but not the

847 linear trend of u_j^c is identified by the data. We thus constrained the linear trend of u_j^c to zero by
 848 taking the generalised inverse of the full conditional precision. We then constrained the mean of
 849 u_j^c to zero using the one-dimensional version of the correction described in Rue and Held¹³².

850

851 *Age Model*

852 To capture sex-specific patterns of growth, especially adolescent growth spurts, we modelled
 853 age using cubic splines. The number and position of splines' knots were selected based on a
 854 combination of physiological and statistical considerations, as described in a national level
 855 analysis¹³. For age group h with age z , in study i , the age effect for height and BMI is given,
 856 respectively, by:

857
$$\gamma_i(z_h) = \gamma_{1i}z_h + \gamma_{2i}z_h^2 + \gamma_{3i}z_h^3 + \gamma_{4i}(z_h - k_1)_+^3 + \gamma_{5i}(z_h - k_2)_+^3 + \gamma_{6i}(z_h - k_3)_+^3 + \gamma_{7i}(z_h - k_4)_+^3 \quad (\text{height})$$

858
$$\gamma_i(z_h) = \gamma_{1i}z_h + \gamma_{2i}z_h^2 + \gamma_{3i}z_h^3 + \gamma_{4i}(z_h - k_1)_+^3 + \gamma_{5i}(z_h - k_2)_+^3 \quad (\text{BMI})$$

859

860 For height, four spline knots were placed at ages $\{k_1, k_2, k_3, k_4\} = \{8, 10, 12, 14\}$ for girls and at
 861 ages $\{k_1, k_2, k_3, k_4\} = \{10, 12, 14, 16\}$ for boys. For BMI, we used two spline knots (at ages 10
 862 and 15 years) because, at the population level, changes in BMI with age are smoother than
 863 those in height^{13,42,133}. Each of the spline coefficients was allowed to vary across countries, with
 864 a hierarchical structure as described in a previous paper¹³⁰, using the equation below, where ψ
 865 is the global intercept and c, r, s are the country, region and super-region random intercepts,
 866 respectively, The age effect coefficients ($\gamma_{k,i}$) for each age group h , with age z , are given by:

867
$$\gamma_{k,i} = \psi_k + c_{k,j[i]} + r_{k,l[i]} + s_{k,m[i]}$$

$$c_{k,j} \sim N(0, \sigma_{k,c}^2)$$

$$r_{k,l} \sim N(0, \sigma_{k,r}^2)$$

$$s_{k,l} \sim N(0, \sigma_{k,s}^2)$$

868 A flat improper prior was placed of each of the σ_k 's.

869

870 *Study-level term and study-specific random effects*

871 Mean height or BMI from individual studies may deviate from the true country-year mean due to
872 factors associated with sampling, response or measurement. We used a study-level term to
873 help account for potential systematic differences associated with data sources that are
874 representative of sub-national and community populations. Our model thus included time-
875 varying offsets (referred to as fixed effects above) for sub-national and community data in the
876 term $X_i\beta$:

$$X_i\beta = \beta_1 I \{X_{j[i],t[i]}^{cvrg} = \text{subnational}\} + \beta_2 I \{X_{j[i],t[i]}^{cvrg} = \text{subnational}\} t_i + \\ \beta_3 I \{X_{j[i],t[i]}^{cvrg} = \text{community}\} + \beta_4 I \{X_{j[i],t[i]}^{cvrg} = \text{community}\} t_i$$

877

878 where $X_{j[i],t[i]}^{cvrg}$ is the indicator for whether the coverage of study i , in country j and year t , is sub-
879 national or community.

880

881 Even after accounting for sampling variability, national studies may still not reflect the country's
882 true mean BMI level with perfect accuracy, and sub-national and community studies have even
883 larger variability. In study i , the study-specific random effect e_i allows all age groups from the
884 same study to have an unusually high or an unusually low mean after conditioning on the other
885 terms in the model. Each e_i is assigned a normal prior with variance depending on whether
886 study i is representative at the national, sub-national or community level. Random effects from
887 national studies were constrained to have smaller variance (v_n) than random effects of sub-
888 national studies (v_s), which were in turn constrained to have smaller variance than community
889 studies (v_c). To make country-level predictions, we set $e_i = 0$, thus not including random effects
890 due to imperfections in study design and to within-country variability of BMI means.

891

892 *Urban and rural strata*

893 To model mean height and BMI by urban and rural places of residence, the model included
894 offsets for the two strata. The offsets were captured by country-specific intercept, linear time
895 and age effects, using a centred indicator term ($I_{s,i}$):

$$896 \quad I_{s,i} [p_{j[i]} + q_{j[i]}t_i + r_{j[i]}z_h + d_i] \quad (\text{where, } I_{s,i} = -1 + 2X_{s,i}^{urb})$$

897 with

$$X_{s,i}^{urb} = \begin{cases} 1, & \text{if stratum } s \text{ contains only urban individuals} \\ 0, & \text{if stratum } s \text{ contains only rural individuals} \\ X_{j[i],t[i]}^{urb} & \text{if stratum } s \text{ contains a mixture of urban and rural individuals} \end{cases}$$

898 In other words, for data not stratified by place of residence, the model treats the unstratified
899 mean height or BMI as equivalent to the weighted sum of the (unobserved) urban sample mean
900 BMI and rural sample mean BMI, with the weights based on the proportion of the study
901 country's population living in urban areas in the year of the survey ($X_{j[i],t[i]}^{urb}$).

902

903 The intercept (p) and slope (q) terms capture the country-to-country variation in the magnitude
904 of the height or BMI difference between urban and rural populations and how the difference
905 changes over time. The slope (r) captures the country-to-country variation in the BMI or height
906 difference between urban and rural populations across age groups. These were specified with
907 the same geographical hierarchy as the country-specific intercepts (a) and slopes (b):

$$908 \quad p_j = p_j^c + p_{k[j]}^r + p_{l[k]}^s + p^g,$$

$$909 \quad q_j = q_j^c + q_{k[j]}^r + q_{l[k]}^s + q^g,$$

$$910 \quad r = r_j^c + r_{k[j]}^r + r_{l[k]}^s + r^g,$$

$$911 \quad p_j^x \sim N(0, \kappa_p^x),$$

$$912 \quad q_j^x \sim N(0, \kappa_q^x),$$

$$913 \quad r_j^x \sim N(0, \kappa_r^x) \quad (\text{where, } x = \{c, r, s\})$$

914 The study random effect term d_i incorporates deviations from the country-level urban-rural
915 difference in each study and is analogous to e_i .

916

917 *Residual age-by-study variability*

918 The age patterns across communities within a given country may differ from their country's
919 overall age pattern. This within-study variability cannot be captured by the e 's, which are equal
920 across age-specific observations in each study, so we include an additional variance component
921 for each study, τ_i^2 . We again assume that there is less residual variability in national studies
922 than in sub-national and community-level studies, with $\tau_n^2 < \tau_s^2 < \tau_c^2$.

923

924 **Model implementation**

925 All analyses were done separately by sex because age, geographical and temporal patterns of
926 height and BMI differ between girls and boys^{13,43}. We fitted the statistical model using Markov
927 chain Monte Carlo (MCMC). We started 35 parallel MCMC from randomly-generated over-
928 dispersed starting values. For computational efficiency, each chain was run for a total of 75,000
929 iterations. All chains converged to the same target distribution within this number, but with the
930 over-dispersed initial values, the length of burn-in required to converge to the target distribution
931 varied. After the runs were completed, we used trace plots to monitor convergence and select
932 chains that had completed burn-in within 35,000 iterations. This resulted in 16 chains for boys
933 and 17 for girls for BMI; 14 chains for boys and 16 for girls for height. Within each chain, post-
934 burn-in iterations were thinned by keeping every 10th iteration, which were then combined for all
935 chains and further thinned to a final set of 5,000 draws of the model parameter estimates. We
936 used the posterior distribution of the model parameters to obtain the posterior distributions of
937 our outcomes: mean urban and rural height and BMI, and the urban-rural difference in mean
938 height and BMI. Posterior estimates were made for by one-year age groups from five to 19

939 years, as well as for age-standardised outcomes, by year. The reported credible intervals
940 represent the 2.5th and the 97.5th percentiles of the posterior distributions. We also report the
941 posterior standard deviation of estimates, and posterior probability that the estimated change in
942 height or BMI in rural or urban areas, and in the estimated urban-rural height or BMI difference
943 over time, represents a true increase or decrease.

944
945 Convergence was confirmed for the country-sex specific posterior outcomes – namely mean
946 urban height and BMI, mean rural height and BMI and the urban-rural difference in mean height
947 and BMI – for reporting ages (5, 10, 15, 19 years and age-standardised) and years (1990 and
948 2020) using the R-hat diagnostic^{140,141}. For height, the 2.5th to 97.5th percentiles of the R-hats for
949 the reporting ages and years were 0.999-1.010 for girls and 0.999-1.004 for boys. For BMI, the
950 2.5th to 97.5th percentiles of the R-hats were 0.999-1.004 for girls and 0.999-1.005 for boys.

951
952 We applied the pool-adjacent-violators algorithm, a monotonic regression that uses an iterative
953 algorithm based on least squares to fit a free-form line to a sequence of observations such that
954 the fitted line is non-decreasing^{142,143}, on the posterior height estimates to ensure that each birth
955 cohort's height increased monotonically with age. In practice, this had little effect on the results,
956 with height at age 19 years adjusted by an average 0.26 cm or less for both boys and girls.

957
958 **Strengths and limitations**

959 An important strength of our study is its novel scope of presenting consistent and comparable
960 estimates of urban and rural height and BMI among school-aged children and adolescents,
961 which is essential to formulate and evaluate policies that aim to improve health in these
962 formative ages. We used an unprecedented amount of population-based data from 194
963 countries and territories covering ~99% of the world's population. We maintained a high level of
964 data quality and representativeness through repeated checks of study characteristics against

965 our inclusion and exclusion criteria, and did not use any self-reported data to avoid bias in
966 height and weight. Data were analysed according to a consistent protocol, and the
967 characteristics and quality of data from each country were rigorously verified through repeated
968 checks by NCD-RisC members. We used a statistical model that used all available data and
969 took into account the epidemiological features of height and BMI by using non-linear time trends
970 and age associations. The model used the available information on the urban-rural difference in
971 height and BMI and estimated the age- and time-varying urban-rural difference for all countries
972 hierarchically.

973

974 Despite our extensive efforts to identify and access data, some countries and regions had fewer
975 data, especially those in the Caribbean and Polynesia, Micronesia, and sub-Saharan Africa. Of
976 the studies used, fewer than half had data for children aged 5-9 years compared with nearly
977 90% with data for children and adolescents aged 10-19 years, which increases the uncertainty
978 of findings. The scarcity of data is reflected in the larger uncertainty of our estimates for these
979 countries and regions, and younger age groups. This reflects the need to systematically include
980 school-aged children in both health and nutrition surveys, and especially in countries where
981 school enrolment is high, to use schools as a platform for monitoring growth and developmental
982 outcomes for entire national populations and key subgroups such as those in rural and urban
983 areas. Though urban and rural classifications are commonly based on national statistical offices
984 definitions, classification of cities and rural areas may, appropriately, vary by country due to their
985 demographic characteristics (e.g., population size or density), economic activity, administrative
986 structures, infrastructure and environment. Similarly, urbanisation takes place through a variety
987 of mechanisms such as changes in fertility in rural and urban areas, migration, and
988 reclassification of previously rural areas to urban as they grow and industrialise. Each of these
989 mechanisms may have different implications for nutrition and physical activity, and hence height
990 and/or BMI, and should be a subject of studies that follow individual participants and changes in

991 their place of residence. Finally, there is variation in growth and development of children within
992 rural or urban areas, based on household socioeconomic status and community characteristics
993 that affect access to and the quality of nutrition, the living environment and healthcare^{29,50,144}.
994 Among these, in some cities, a large number of families live in slums^{25,145}. School-aged children
995 and adolescents in slums have nutrition, environment and healthcare access that is typically
996 worse than other residents of the city, although often better than those in rural areas^{25,145-148}.

997

998 **Data availability**

999 Estimates of mean BMI and height by country, year, sex, single year of age as well as age-
1000 standardised, and place of residence (urban and rural) will be available from www.ncdrisc.org in
1001 machine-readable numerical format and as visualisations upon publication of the paper. Input
1002 data from publicly available sources can also be downloaded from www.ncdrisc.org upon
1003 publication of the paper. For other data sources, contact information for data providers can be
1004 obtained from www.ncdrisc.org.

1005

1006 **Code availability**

1007 The computer code for the Bayesian hierarchical model as well as code to generate tables and
1008 figures used in this work will be available at www.ncdrisc.org upon publication of the paper.

1009

1010

1011 **References**

- 1012 116 NCD Risk Factor Collaboration (NCD-RisC). Trends in adult body-mass index in 200
1013 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies
1014 with 19.2 million participants. *Lancet* 387, 1377-1396, doi:10.1016/s0140-6736(16)30054-x
1015 (2016).
- 1016 117 Danaei, G. et al. National, regional, and global trends in systolic blood pressure since
1017 1980: systematic analysis of health examination surveys and epidemiological studies with 786
1018 country-years and 5.4 million participants. *Lancet* 377, 568-577, doi:10.1016/s0140-
1019 6736(10)62036-3 (2011).
- 1020 118 Danaei, G. et al. National, regional, and global trends in fasting plasma glucose and
1021 diabetes prevalence since 1980: systematic analysis of health examination surveys and
1022 epidemiological studies with 370 country-years and 2.7 million participants. *Lancet* 378, 31-40,
1023 doi:10.1016/s0140-6736(11)60679-x (2011).
- 1024 119 Farzadfar, F. et al. National, regional, and global trends in serum total cholesterol since
1025 1980: systematic analysis of health examination surveys and epidemiological studies with 321
1026 country-years and 3.0 million participants. *Lancet* 377, 578-586, doi:10.1016/s0140-
1027 6736(10)62038-7 (2011).
- 1028 120 Finucane, M. M. et al. National, regional, and global trends in body-mass index since
1029 1980: systematic analysis of health examination surveys and epidemiological studies with 960
1030 country-years and 9.1 million participants. *Lancet* 377, 557-567, doi:10.1016/s0140-
1031 6736(10)62037-5 (2011).
- 1032 121 Cline, M. G., Meredith, K. E., Boyer, J. T. & Burrows, B. Decline of height with age in
1033 adults in a general population sample: estimating maximum height and distinguishing birth
1034 cohort effects from actual loss of stature with aging. *Hum Biol* 61, 415-425 (1989).
- 1035 122 Lumley, T. Analysis of Complex Survey Samples. *Journal of Statistical Software* 9, 1 - 19,
1036 doi:10.18637/jss.v009.i08 (2004).
- 1037 123 United Nations Department of Economic and Social Affairs, Population Division. *World
1038 Urbanization Prospects: The 2018 Revision* (United Nations, New York, 2019).
- 1039 124 Hayes, A. J., Clarke, P. M. & Lung, T. W. Change in bias in self-reported body mass
1040 index in Australia between 1995 and 2008 and the evaluation of correction equations. *Popul
1041 Health Metr* 9, 53, doi:10.1186/1478-7954-9-53 (2011).
- 1042 125 Connor Gorber, S., Tremblay, M., Moher, D. & Gorber, B. A comparison of direct vs.
1043 self-report measures for assessing height, weight and body mass index: a systematic review.
1044 *Obes Rev* 8, 307-326, doi:10.1111/j.1467-789X.2007.00347.x (2007).
- 1045 126 Ezzati, M., Martin, H., Skjold, S., Vander Hoorn, S. & Murray, C. J. L. Trends in national
1046 and state-level obesity in the USA after correction for self-report bias: analysis of health surveys.
1047 *J R Soc Med* 99, 250-257, doi:10.1177/014107680609900517 (2006).
- 1048 127 Ahmad, O. B. et al. Age standardization of rates: a new WHO standard. *Geneva: World
1049 Health Organization* 9, 1-14 (2001).
- 1050 128 Finucane, M. M., Paciorek, C. J., Stevens, G. A. & Ezzati, M. Semiparametric Bayesian
1051 Density Estimation With Disparate Data Sources: A Meta-Analysis of Global Childhood
1052 Undernutrition. *Journal of the American Statistical Association* 110, 889-901 (2015).
- 1053 129 Finucane, M. M., Paciorek, C. J., Danaei, G. & Ezzati, M. Bayesian Estimation of
1054 Population-Level Trends in Measures of Health Status. *Statistical Science* 29, 18-25 (2014).
- 1055 130 NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in hypertension
1056 prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201
1057 population-representative studies with 104 million participants. *Lancet* 398, 957-980,
1058 doi:10.1016/s0140-6736(21)01330-1 (2021).
- 1059 131 NCD Risk Factor Collaboration (NCD-RisC). A century of trends in adult human height.
1060 *Elife* 5, doi:10.7554/eLife.13410 (2016).

1061 132 Rue, H. v. & Held, L. Gaussian Markov random fields : theory and applications.
1062 (Chapman & Hall/CRC, 2005).

1063 133 Cameron, N. I. Human growth and development. (Academic Press, 2002).

1064 134 Tanner, J. M., Whitehouse, R. H., Marubini, E. & Resele, L. F. The adolescent growth
1065 spurt of boys and girls of the Harpenden growth study. *Ann Hum Biol* 3, 109-126,
1066 doi:10.1080/03014467600001231 (1976).

1067 135 Gelman, A. & Hill, J. Data analysis using regression and multilevel/hierarchical models.
1068 (Cambridge University Press, 2007).

1069 136 Gelman, A. Prior distributions for variance parameters in hierarchical models. *Bayesian*
1070 *Anal.* 1, 515-533 (2006).

1071 137 Breslow, N. E. & Clayton, D. G. Approximate Inference in Generalized Linear Mixed
1072 Models. *Journal of the American Statistical Association* 88, 9-25, doi:10.2307/2290687 (1993).

1073 138 Wood, S. N. Generalized additive models : an introduction with R. (Chapman &
1074 Hall/CRC, 2006).

1075 139 Harville, D. A. Matrix Algebra from a Statistician's Perspective. (Springer-Verlag, 2008).

1076 140 Vehtari, A., Gelman, A., Simpson, D., Carpenter, B. & Bürkner, P.-C. Rank-normalization,
1077 folding, and localization: an improved R for assessing convergence of MCMC (with discussion).
1078 *Bayesian analysis* 16, 667-718 (2021).

1079 141 Stan Development Team. RStan: the R interface to Stan, < <https://mc-stan.org/>. > (2022).

1080 142 Best, M. J. & Chakravarti, N. Active set algorithms for isotonic regression; a unifying
1081 framework. *Mathematical Programming* 47, 425-439 (1990).

1082 143 De Leeuw, J., Hornik, K. & Mair, P. Isotone optimization in R: pool-adjacent-violators
1083 algorithm (PAVA) and active set methods. *Journal of statistical software* 32, 1-24 (2010).

1084 144 Huang, R., Moudon, A. V., Cook, A. J. & Drewnowski, A. The spatial clustering of obesity:
1085 does the built environment matter? *Journal of Human Nutrition and Dietetics* 28, 604-612,
1086 doi:<https://doi.org/10.1111/jhn.12279> (2015).

1087 145 Ezeh, A. et al. The history, geography, and sociology of slums and the health problems
1088 of people who live in slums. *Lancet* 389, 547-558, doi:10.1016/s0140-6736(16)31650-6 (2017).

1089 146 Fink, G., Günther, I. & Hill, K. Slum Residence and Child Health in Developing Countries.
1090 *Demography* 51, 1175-1197, doi:10.1007/s13524-014-0302-0 (2014).

1091 147 Jonah, C. M. P. & May, J. D. The nexus between urbanization and food insecurity in
1092 South Africa: does the type of dwelling matter? *International Journal of Urban Sustainable*
1093 *Development* 12, 1-13, doi:10.1080/19463138.2019.1666852 (2020).

1094 148 Habitat for Humanity. Progress Report: Sustainable Development Goal 11 (Target 11.1).
1095 (Habitat for Humanity International, New York, 2019).

1096 **Supplementary information**

1097 This file contains Supplementary Tables 1-4, Supplementary Figures 1-6 and Supplementary
1098 References.

1099

1100 **Acknowledgments**

1101 This study was funded by the UK Medical Research Council (grant number MR/V034057/1),
1102 Wellcome Trust (Pathways to Equitable Healthy Cities grant 209376/Z/17/Z), AstraZeneca
1103 Young Health Programme and the European Commission (STOP project through EU Horizon
1104 2020 research and innovation programme under Grant Agreement 774548). We thank W Dietz,
1105 L Jaacks and W Johnson for recommendations of relevant citations.

1106

1107 **Author contributions**

1108 AM, BZ, ARM, HB and RS led the data collection and management. AM, BZ, ARM, HB, CJP,
1109 JEB and ME developed the statistical method. AM, BZ, ARM and HB coded the statistical
1110 method. Am conducted analyses and prepared results. Pooled Analysis and Writing Group
1111 contributed to study design, collated data and checked data sources in consultation with the
1112 Country and Regional Data Group. Country and Regional Data Group collected and reanalysed
1113 data and checked pooled data. ME, AM, BZ, ARM and HB wrote the first draft of the report.
1114 Other authors commented on the draft report.

1115

1116 **Author information**

1117 ME reports a charitable grant from the AstraZeneca Young Health Programme. The authors
1118 alone are responsible for the views expressed in this Article and they do not necessarily
1119 represent the views, decisions, or policies of the institutions with which they are affiliated.

1120

1121 **Corresponding author** Correspondence to Majid Ezzati (majid.ezzati@imperial.ac.uk)

1122 **NCD Risk Factor Collaboration (NCD-RisC)**

1123 Pooled Analysis and Writing (*equal contribution)

1124 Anu Mishra (Imperial College London, London, UK)*; Bin Zhou (Imperial College London,
1125 London, UK)*; Andrea Rodriguez-Martinez (Imperial College London, London, UK)*; Honor
1126 Bixby (McGill University, Montreal, Québec, Canada; University of Essex, Colchester, UK)*;
1127 Rosie K Singleton (Imperial College London, London, UK); Rodrigo M Carrillo-Larco (Imperial
1128 College London, London, UK); Kate E Sheffer (Imperial College London, London, UK);
1129 Christopher J Paciorek (University of California Berkeley, Berkeley, CA, USA); James E Bennett
1130 (Imperial College London, London, UK); Victor Lhoste (Imperial College London, London, UK);
1131 Maria LC Iurilli (Imperial College London, London, UK); Mariachiara Di Cesare (University of
1132 Essex, Colchester, UK); James Bentham (University of Kent, Canterbury, UK); Nowell H Phelps
1133 (Imperial College London, London, UK); Marisa K Sophiea (Imperial College London, London
1134 UK), Gretchen A Stevens (World Health Organization, Geneva, Switzerland); Goodarz Danaei
1135 (Harvard TH Chan School of Public Health, Boston, MA, USA); Melanie J Cowan (World Health
1136 Organization, Geneva, Switzerland); Stefan Savin (World Health Organization, Geneva,
1137 Switzerland); Leanne M Riley (World Health Organization, Geneva, Switzerland); Edward W
1138 Gregg (Imperial College London, London, UK); Wichai Aekplakorn (Mahidol University, Nakhon
1139 Pathom, Thailand); Noor Ani Ahmad (Ministry of Health, Kuala Lumpur, Malaysia); Jennifer L
1140 Baker (Bispebjerg and Frederiksberg Hospital, Copenhagen, Denmark); Adela Chirita-Emandi
1141 (Victor Babes University of Medicine and Pharmacy, Timisoara, Romania); Farshad Farzadfar
1142 (Non-Communicable Diseases Research Center, Tehran, Iran); Günther Fink (Swiss Tropical
1143 and Public Health Institute, Basel, Switzerland; University of Basel, Basel, Switzerland); Mirjam
1144 Heinen (World Health Organization Regional Office for Europe, Moscow, Russian Federation);
1145 Nayu Ikeda (National Institutes of Biomedical Innovation, Health and Nutrition, Tokyo, Japan);
1146 Andre P Kengne (South African Medical Research Council, Cape Town, South Africa); Young-
1147 Ho Khang (Seoul National University College of Medicine, Seoul, Republic of Korea); Tiina

1148 Laatikainen (University of Eastern Finland, Kuopio, Finland; Finnish Institute for Health and
1149 Welfare, Helsinki, Finland); Avula Laxmaiah (ICMR - National Institute of Nutrition, Hyderabad,
1150 India); Jun Ma (Peking University, Beijing, China); Michele Monroy-Valle (University of San
1151 Carlos of Guatemala, Guatemala City, Guatemala); Malay K Mridha (BRAC James P Grant
1152 School of Public Health, Dhaka, Bangladesh); Cristina P Padez (University of Coimbra,
1153 Coimbra, Portugal); Andrew Reynolds (University of Otago, Dunedin, New Zealand); Maroje
1154 Sorić (University of Zagreb, Zagreb, Croatia); Gregor Starc (University of Ljubljana, Ljubljana,
1155 Slovenia); James P Wirth (GroundWork, Geneva, Switzerland); Zulfiqar A Bhutta (The Hospital
1156 for Sick Children, Toronto, Ontario, Canada; The Aga Khan University, Karachi, Pakistan);
1157 Robert E Black (Johns Hopkins University, Baltimore, MD, USA); Majid Ezzati (Imperial College
1158 London, London, UK; University of Ghana, Accra, Ghana)

1159

1160 Country and Regional Data (* equal contribution; listed alphabetically)

1161 Leandra Abarca-Gómez (Caja Costarricense de Seguro Social, San José, Costa Rica)*; Ziad A
1162 Abdeen (Al-Quds University, East Jerusalem, State of Palestine)*; Shynar Abdrakhmanova
1163 (National Center of Public Health, Nur-Sultan, Kazakhstan)*; Suhaila Abdul Ghaffar (Ministry of
1164 Health, Kuala Lumpur, Malaysia)*; Hanan F Abdul Rahim (Qatar University, Doha, Qatar)*;
1165 Zulfiya Abdurrahmonova (Ministry of Health and Social Protection, Dushanbe, Tajikistan)*;
1166 Niveen M Abu-Rmeileh (Birzeit University, Birzeit, State of Palestine)*; Jamila Abubakar Garba
1167 (Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria)*; Benjamin Acosta-Cazares
1168 (Instituto Mexicano del Seguro Social, Mexico City, Mexico)*; Ishag Adam (Qassim University,
1169 Unaizah, Saudi Arabia)*; Marzena Adamczyk (RehaKlinika, Rzeszów, Poland)*; Robert J
1170 Adams (Flinders University, Adelaide, South Australia, Australia)*; Seth Adu-Afarwuah
1171 (University of Ghana, Accra, Ghana)*; Kaosar Afsana (BRAC James P Grant School of Public
1172 Health, Dhaka, Bangladesh)*; Shoaib Afzal (University of Copenhagen, Copenhagen, Denmark;
1173 Copenhagen University Hospital, Copenhagen, Denmark)*; Imelda A Agdeppa (Food and

1174 Nutrition Research Institute, Taguig, Philippines)*; Javad Aghazadeh-Attari (Urmia University of
1175 Medical Sciences, Urmia, Iran)*; Åsa Ågren (Umeå University, Umeå, Sweden)*; Hassan
1176 Aguentaou (Ibn Tofail University, Kénitra, Morocco)*; Carlos A Aguilar-Salinas (Instituto Nacional
1177 de Ciencias Médicas y Nutrición, Mexico City, Mexico)*; Charles Agyemang (University of
1178 Amsterdam, Amsterdam, The Netherlands)*; Mohamad Hasnan Ahmad (Ministry of Health,
1179 Kuala Lumpur, Malaysia)*; Ali Ahmadi (Modeling in Health Research Center, Shahrekord, Iran)*;
1180 Naser Ahmadi (Non-Communicable Diseases Research Center, Tehran, Iran)*; Nastaran
1181 Ahmadi (Shahid Sadoughi University of Medical Sciences, Yazd, Iran)*; Imran Ahmed (The Aga
1182 Khan University, Karachi, Pakistan)*; Soheir H Ahmed (University of Oslo, Oslo, Norway)*;
1183 Wolfgang Ahrens (Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen,
1184 Germany)*; Gulmira Aitmurzaeva (Republican Center for Health Promotion, Bishkek,
1185 Kyrgyzstan)*; Kamel Ajlouni (National Center for Diabetes, Endocrinology and Genetics,
1186 Amman, Jordan)*; Hazzaa M Al-Hazzaa (Princess Nourah bint Abdulrahman University, Riyadh,
1187 Saudi Arabia)*; Badreya Al-Lahou (Kuwait Institute for Scientific Research, Kuwait City,
1188 Kuwait)*; Rajaa Al-Raddadi (King Abdulaziz University, Jeddah, Saudi Arabia)*; Huda M Al
1189 Hourani (The Hashemite University, Zarqa, Jordan)*; Nawal M Al Qaoud (Ministry of Health,
1190 Kuwait City, Kuwait)*; Monira Alarouj (Dasman Diabetes Institute, Kuwait City, Kuwait)*; Fadia
1191 AlBuhairan (Aldara Hospital and Medical Center, Riyadh, Saudi Arabia)*; Shahla AlDhukair
1192 (King Abdullah International Medical Research Center, Riyadh, Saudi Arabia)*; Maryam A
1193 Aldwairji (Ministry of Health, Kuwait City, Kuwait)*; Sylvia Alexius (Universidade Federal da
1194 Integração Latino-Americana, Foz do Iguaçu, Brazil)*; Mohamed M Ali (World Health
1195 Organization, Geneva, Switzerland)*; Abdullah Alkandari (Dasman Diabetes Institute, Kuwait
1196 City, Kuwait)*; Ala'a Alkerwi (Luxembourg Institute of Health, Strassen, Luxembourg)*; Buthaina
1197 M Alkhatib (The Hashemite University, Zarqa, Jordan)*; Kristine Allin (Bispebjerg and
1198 Frederiksberg Hospital, Copenhagen, Denmark)*; Mar Alvarez-Pedrerol (Barcelona Institute for
1199 Global Health CIBERESP, Barcelona, Spain)*; Eman Aly (World Health Organization Regional

1200 Office for the Eastern Mediterranean, Cairo, Egypt)*; Deepak N Amarpurkar (Bombay Hospital
1201 and Medical Research Centre, Mumbai, India)*; Pilar Amiano Etxezarreta (Departamento de
1202 Salud del Gobierno Vasco, San Sebastián, Spain)*; John Amoah (Ghana Health Service,
1203 Kintampo, Ghana)*; Norbert Amougou (UMR CNRS-MNHN 7206, Paris, France)*; Philippe
1204 Amouyel (University of Lille, Lille, France; Lille University Hospital, Lille, France)*; Lars Bo
1205 Andersen (Western Norway University of Applied Sciences, Sogndal, Norway)*; Sigmund A
1206 Anderssen (Norwegian School of Sport Sciences, Oslo, Norway)*; Odysseas Androutsos
1207 (University of Thessaly, Trikala, Greece)*; Lars Ängquist (University of Copenhagen,
1208 Copenhagen, Denmark)*; Ranjit Mohan Anjana (Madras Diabetes Research Foundation,
1209 Chennai, India)*; Alireza Ansari-Moghaddam (Zahedan University of Medical Sciences,
1210 Zahedan, Iran)*; Elena Anufrieva (Yekaterinburg State Medical Academy, Yekaterinburg,
1211 Russia)*; Hajer Aounallah-Skhiri (National Institute of Public Health, Tunis, Tunisia)*; Joana
1212 Araújo (Institute of Public Health of the University of Porto, Porto, Portugal)*; Inger Ariansen
1213 (Norwegian Institute of Public Health, Oslo, Norway)*; Tahir Aris (Ministry of Health, Kuala
1214 Lumpur, Malaysia)*; Raphael E Arku (University of Massachusetts Amherst, Amherst, MA,
1215 USA)*; Nimmathota Arlappa (ICMR - National Institute of Nutrition, Hyderabad, India)*; Krishna
1216 K Aryal (Public Health Promotion and Development Organization, Kathmandu, Nepal)*; Nega
1217 Aseffa (Haramaya University, Dire Dawa, Ethiopia)*; Thor Aspelund (University of Iceland,
1218 Reykjavik, Iceland)*; Felix K Assah (University of Yaoundé 1, Yaoundé, Cameroon)*; Maria
1219 Alice Altenburg Assis (Federal University of Santa Catarina, Florianópolis, Brazil)*; Maria Cecília
1220 F Assunção (Federal University of Pelotas, Pelotas, Brazil)*; May Soe Aung (University of
1221 Medicine 1, Yangon, Myanmar)*; Juha Auvinen (Oulu University Hospital, Oulu, Finland;
1222 University of Oulu, Oulu, Finland)*; Mária Avdičová (Regional Authority of Public Health, Banská
1223 Bystrica, Slovakia)*; Shina Avi (Tel Aviv University, Tel Aviv, Israel; Hebrew University of
1224 Jerusalem, Jerusalem, Israel)*; Ana Azevedo (University of Porto Medical School, Porto,
1225 Portugal)*; Mohsen Azimi-Nezhad (Neyshabur University of Medical Sciences, Neyshabur,

1226 Iran)*; Fereidoun Azizi (Research Institute for Endocrine Sciences, Tehran, Iran)*; Mehrdad
1227 Azmin (Non-Communicable Diseases Research Center, Tehran, Iran)*; Bontha V Babu (Indian
1228 Council of Medical Research, New Delhi, India)*; Maja Bæksgaard Jørgensen (National Institute
1229 of Public Health, Copenhagen, Denmark)*; Azli Baharudin (Ministry of Health, Kuala Lumpur,
1230 Malaysia)*; Suhad Bahijri (King Abdulaziz University, Jeddah, Saudi Arabia)*; Marta Bakacs
1231 (National Institute of Pharmacy and Nutrition, Budapest, Hungary)*; Nagalla Balakrishna (ICMR
1232 - National Institute of Nutrition, Hyderabad, India)*; Yulia Balanova (National Medical Research
1233 Centre for Therapy and Preventive Medicine, Moscow, Russia)*; Mohamed Bamoshmoosh
1234 (University of Science and Technology, Sana'a, Yemen)*; Maciej Banach (Medical University of
1235 Lodz, Lodz, Poland)*; José R Banegas (Universidad Autónoma de Madrid CIBERESP, Madrid,
1236 Spain)*; Joanna Baran (University of Rzeszów, Rzeszów, Poland)*; Rafal Baran (University of
1237 Rzeszów, Rzeszów, Poland)*; Carlo M Barbagallo (University of Palermo, Palermo, Italy)*;
1238 Valter Barbosa Filho (Federal Institute of Education, Science and Technology of Ceara, Ceara,
1239 Brazil)*; Alberto Barceló (Pan American Health Organization, Washington, DC, USA)*; Maja
1240 Baretić (University Hospital Center Zagreb, Zagreb, Croatia)*; Amina Barkat (Mohammed V
1241 University, Rabat, Morocco)*; Joaquin Barnoya (Unidad de Cirugia Cardiovascular, Guatemala
1242 City, Guatemala)*; Lena Barrera (Univesrsidad del Valle, Cali, Colombia)*; Marta Barreto
1243 (National Institute of Health Doutor Ricardo Jorge, Lisbon, Portugal; NOVA University Lisbon,
1244 Lisbon, Portugal)*; Aluisio JD Barros (Federal University of Pelotas, Pelotas, Brazil)*; Mauro
1245 Virgílio Gomes Barros (University of Pernambuco, Recife, Brazil)*; Anna Bartosiewicz
1246 (University of Rzeszów, Rzeszów, Poland)*; Abdul Basit (Baqai Institute of Diabetology and
1247 Endocrinology, Karachi, Pakistan)*; Joao Luiz D Bastos (Federal University of Santa Catarina,
1248 Florianópolis, Brazil)*; Iqbal Bata (Dalhousie University, Halifax, Nova Scotia, Canada)*; Anwar
1249 M Batieha (Jordan University of Science and Technology, Irbid, Jordan)*; Aline P Batista
1250 (Universidade Federal de Ouro Preto, Ouro Preto, Brazil)*; Rosangela L Batista (Federal
1251 University of Maranhão, São Luís, Brazil)*; Zhamilya Battakova (National Center of Public

1252 Health, Nur-Sultan, Kazakhstan)*; Assembekov Batyrbek (Al-Farabi Kazakh National University,
1253 Almaty, Kazakhstan)*; Louise A Baur (University of Sydney, Sydney, New South Wales,
1254 Australia)*; Pascal M Bayauli (Cliniques Universitaires de Kinshasa, Kinshasa, DR Congo)*;
1255 Robert Beaglehole (University of Auckland, Auckland, New Zealand)*; Silvia Bel-Serrat
1256 (University College Dublin, Dublin, Ireland)*; Antonisamy Belavendra (Christian Medical College
1257 Vellore, Vellore, India)*; Habiba Ben Romdhane (University Tunis El Manar, Tunis, Tunisia)*;
1258 Judith Benedics (Federal Ministry of Social Affairs, Health, Care and Consumer Protection,
1259 Vienna, Austria)*; Mikhail Benet (Cafam University Foundation, Bogotá, Colombia)*; Gilda
1260 Estela Benitez Rolandi (Ministerio de Salud Pública y Bienestar Social, Asunción, Paraguay)*;
1261 Elling Bere (University of Agder, Kristiansand, Norway)*; Ingunn Holden Bergh (Norwegian
1262 Institute of Public Health, Oslo, Norway)*; Yemane Berhane (Addis Continental Institute of
1263 Public Health, Addis Ababa, Ethiopia)*; Salim Berkinbayev (Kazakh National Medical University,
1264 Almaty, Kazakhstan)*; Antonio Bernabe-Ortiz (Universidad Peruana Cayetano Heredia, Lima,
1265 Peru)*; Gailute Bernotiene (Lithuanian University of Health Sciences, Kaunas, Lithuania)*;
1266 Ximena Berrios Carrasola (Pontificia Universidad Católica de Chile, Santiago, Chile)*; Heloísa
1267 Bettiol (University of São Paulo, São Paulo, Brazil)*; Manfred E Beutel (Johannes Gutenberg
1268 University, Mainz, Germany)*; Augustin F Beybey (University of Yaoundé 1, Yaoundé,
1269 Cameroon)*; Jorge Bezerra (University of Pernambuco, Recife, Brazil)*; Aroor Bhagyalaxmi (B J
1270 Medical College, Ahmedabad, India)*; Sumit Bharadwaj (Chirayu Medical College, New Delhi,
1271 India)*; Santosh K Bhargava (Sunder Lal Jain Hospital, Delhi, India)*; Hongsheng Bi (Shandong
1272 University of Traditional Chinese Medicine, Shandong, China)*; Yufang Bi (Shanghai Jiao-Tong
1273 University School of Medicine, Shanghai, China)*; Daniel Bia (Universidad de la República,
1274 Montevideo, Uruguay)*; Katia Biasch (University of Strasbourg, Strasbourg, France)*; Elysée
1275 Claude Bika Lele (Institute of Medical Research and Medicinal Plant Studies, Yaoundé,
1276 Cameroon)*; Mukharram M Bikbov (Ufa Eye Research Institute, Ufa, Russia)*; Bihungum Bista
1277 (Nepal Health Research Council, Kathmandu, Nepal)*; Dusko J Bjelica (University of

1278 Montenegro, Niksic, Montenegro)*; Anne A Bjerregaard (Bispebjerg and Frederiksberg Hospital,
1279 Copenhagen, Denmark)*; Peter Bjerregaard (University of Southern Denmark, Copenhagen,
1280 Denmark)*; Espen Bjertness (University of Oslo, Oslo, Norway)*; Marius B Bjertness (University
1281 of Oslo, Oslo, Norway)*; Cecilia Björkelund (University of Gothenburg, Gothenburg, Sweden)*;
1282 Katia V Bloch (Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil)*; Anneke
1283 Blokstra (National Institute for Public Health and the Environment, Bilthoven, The Netherlands)*;
1284 Moran Blychfeld Magnazu (University of Haifa, Haifa, Israel; Ministry of Health, Ramat Gan,
1285 Israel)*; Simona Bo (University of Turin, Turin, Italy)*; Martin Bobak (University College London,
1286 London, UK)*; Lynne M Boddy (Liverpool John Moores University, Liverpool, UK)*; Bernhard O
1287 Boehm (Nanyang Technological University, Singapore, Singapore)*; Jolanda Boer (National
1288 Institute for Public Health and the Environment, Bilthoven, The Netherlands)*; Jose G Boggia
1289 (Universidad de la República, Montevideo, Uruguay)*; Elena Bogova (National Medical
1290 Research Center for Endocrinology, Moscow, Russia)*; Carlos P Boissonnet (Centro de
1291 Educación Médica e Investigaciones Clínicas, Buenos Aires, Argentina)*; Stig E Bojesen
1292 (Copenhagen University Hospital, Copenhagen, Denmark; University of Copenhagen,
1293 Copenhagen, Denmark)*; Marialaura Bonaccio (IRCCS Neuromed, Pozzilli, Italy)*; Vanina
1294 Bongard (Toulouse University School of Medicine, Toulouse, France)*; Alice Bonilla-Vargas
1295 (Caja Costarricense de Seguro Social, San José, Costa Rica)*; Matthias Bopp (University of
1296 Zurich, Zurich, Switzerland)*; Herman Borghs (KU Leuven, Leuven, Belgium)*; Pascal Bovet
1297 (Ministry of Health, Victoria, Seychelles; Unisanté, Lausanne, Switzerland)*; Khadichamo
1298 Boymatova (World Health Organization Country Office in Tajikistan, Dushanbe, Tajikistan)*;
1299 Lien Braeckvelt (Flemish Agency for Care and Health, Brussels, Belgium)*; Lutgart Braeckman
1300 (Ghent University, Ghent, Belgium)*; Marjolijn CE Bragt (FrieslandCampina, Amersfoort, The
1301 Netherlands)*; Imperia Brajkovich (Universidad Central de Venezuela, Caracas, Venezuela)*;
1302 Francesco Branca (World Health Organization, Geneva, Switzerland)*; Juergen Breckenkamp
1303 (Bielefeld University, Bielefeld, Germany)*; João Breda (World Health Organization Regional

1304 Office for Europe, Moscow, Russia)*; Hermann Brenner (German Cancer Research Center,
1305 Heidelberg, Germany)*; Lizzy M Brewster (University of Amsterdam, Amsterdam, The
1306 Netherlands)*; Garry R Brian (The Fred Hollows Foundation, Auckland, New Zealand)*; Yajaira
1307 Briceño (University of the Andes, Mérida, Venezuela)*; Lacramioara Brinduse (Carol Davila
1308 University of Medicine and Pharmacy, Bucharest, Romania)*; Miguel Brito (Instituto Politécnico
1309 de Lisboa, Lisbon, Portugal)*; Sinead Brophy (Swansea University, Swansea, UK)*; Johannes
1310 Brug (National Institute for Public Health and the Environment, Bilthoven, The Netherlands)*;
1311 Graziella Bruno (University of Turin, Turin, Italy)*; Anna Bugge (University College Copenhagen,
1312 Copenhagen, Denmark)*; Frank Buntinx (KU Leuven, Leuven, Belgium)*; Marta Buoncristiano
1313 (World Health Organization Regional Office for Europe, Moscow, Russia)*; Genc Burazeri
1314 (Institute of Public Health, Tirana, Albania)*; Con Burns (Munster Technological University,
1315 Cork, Ireland)*; Antonio Cabrera de León (Universidad de La Laguna, Tenerife, Spain)*; Joseph
1316 Cacciottolo (University of Malta, Msida, Malta)*; Hui Cai (Vanderbilt University, Nashville, TN,
1317 USA)*; Roberta B Caixeta (Pan American Health Organization, Washington, DC, USA)*; Tilema
1318 Cama (Ministry of Health, Tongatapu, Tonga)*; Christine Cameron (Canadian Fitness and
1319 Lifestyle Research Institute, Ottawa, Ontario, Canada)*; José Camolas (Hospital Santa Maria,
1320 Lisbon, Portugal)*; Günay Can (Istanbul University - Cerrahpasa, Istanbul, Turkey)*; Ana Paula
1321 C Cândido (Universidade Federal de Juiz de Fora, Juiz de Fora, Brazil)*; Felicia Cañete
1322 (Ministry of Public Health, Asunción, Paraguay)*; Mario V Capanzana (Food and Nutrition
1323 Research Institute, Taguig, Philippines)*; Naděžda Čapková (National Institute of Public Health,
1324 Prague, Czech Republic)*; Eduardo Capuano (Gaetano Fucito Hospital, Mercato San Severino,
1325 Italy)*; Rocco Capuano (Gaetano Fucito Hospital, Mercato San Severino, Italy)*; Vincenzo
1326 Capuano (Gaetano Fucito Hospital, Mercato San Severino, Italy)*; Marloes Cardol (University of
1327 Groningen, Groningen, The Netherlands)*; Viviane C Cardoso (University of São Paulo, São
1328 Paulo, Brazil)*; Axel C Carlsson (Karolinska Institutet, Huddinge, Sweden)*; Esteban Carmuega
1329 (Centro de Estudios sobre Nutrición Infantil, Buenos Aires, Argentina)*; Joana Carvalho

1330 (University of Porto, Porto, Portugal)*; José A Casajús (University of Zaragoza, Zaragoza,
1331 Spain)*; Felipe F Casanueva (Santiago de Compostela University, Santiago de Compostela,
1332 Spain)*; Maribel Casas (Barcelona Institute for Global Health CIBERESP, Barcelona, Spain)*;
1333 Ertugrul Celikcan (Ministry of Health, Ankara, Turkey)*; Laura Censi (Council for Agricultural
1334 Research and Economics, Rome, Italy)*; Marvin Cervantes-Loaiza (Caja Costarricense de
1335 Seguro Social, San José, Costa Rica)*; Juraci A Cesar (Federal University of Rio Grande, Rio
1336 Grande, Brazil)*; Snehalatha Chamukuttan (India Diabetes Research Foundation, Chennai,
1337 India)*; Angelique Chan (Duke-NUS Medical School, Singapore, Singapore)*; Queenie Chan
1338 (Imperial College London, London, UK)*; Marie-Aline Charles (Paris University, Paris, France)*;
1339 Himanshu K Chaturvedi (ICMR - National Institute of Medical Statistics, New Delhi, India)*; Nish
1340 Chaturvedi (University College London, London, UK)*; Norsyamliina Che Abdul Rahim (Ministry
1341 of Health, Kuala Lumpur, Malaysia)*; Miao Li Chee (Singapore Eye Research Institute,
1342 Singapore, Singapore)*; Chien-Jen Chen (Academia Sinica, Taipei, Taiwan)*; Fangfang Chen
1343 (Capital Institute of Pediatrics, Beijing, China)*; Huashuai Chen (Xiangtan University, Xiangtan,
1344 China)*; Shuohua Chen (Kailuan General Hospital, Tangshan, China)*; Zhengming Chen
1345 (University of Oxford, Oxford, UK)*; Ching-Yu Cheng (Duke-NUS Medical School, Singapore,
1346 Singapore; Singapore Eye Research Institute, Singapore, Singapore)*; Yiling J Cheng (US
1347 Centers for Disease Control and Prevention, Atlanta, GA, USA)*; Bahman Cheraghian (Ahvaz
1348 Jundishapur University of Medical Sciences, Ahvaz, Iran)*; Angela Chetrit (The Gertner Institute
1349 for Epidemiology and Health Policy Research, Ramat Gan, Israel)*; Ekaterina Chikova-Iscener
1350 (National Centre of Public Health and Analyses, Sofia, Bulgaria)*; Mai JM Chinapaw
1351 (Amsterdam UMC Public Health Research Institute, Amsterdam, The Netherlands)*; Anne
1352 Chinnock (Universidad de Costa Rica, San José, Costa Rica)*; Arnaud Chiolero (University of
1353 Fribourg, Fribourg, Switzerland)*; Shu-Ti Chiou (National Taiwan University, Taipei, Taiwan)*;
1354 María-Dolores Chirlaque (CIBERESP, Madrid, Spain)*; Belong Cho (Seoul National University,
1355 Seoul, Republic of Korea)*; Kaare Christensen (University of Southern Denmark, Odense,

1356 Denmark)*; Diego G Christofaro (Universidade Estadual Paulista, Presidente Prudente, Brazil)*;
1357 Jerzy Chudek (Medical University of Silesia, Katowice, Poland)*; Renata Cifkova (Charles
1358 University, Prague, Czech Republic; Thomayer Hospital, Prague, Czech Republic)*; Michelle
1359 Cilia (Primary Health Care, Floriana, Malta)*; Eliza Cinteza (Carol Davila University of Medicine
1360 and Pharmacy, Bucharest, Romania)*; Massimo Cirillo (University of Naples Federico II,
1361 Naples, Italy)*; Frank Claessens (KU Leuven, Leuven, Belgium)*; Janine Clarke (Statistics
1362 Canada, Ottawa, Ontario, Canada)*; Els Clays (Ghent University, Ghent, Belgium)*; Emmanuel
1363 Cohen (UMR CNRS-MNHN 7206, Paris, France)*; Laura-María Compañ-Gabucio (Alicante
1364 Institute for Health and Biomedical Research, Alicante, Spain)*; Hans Concin (Agency for
1365 Preventive and Social Medicine, Bregenz, Austria)*; Susana C Confortin (Federal University of
1366 Maranhão, São Luís, Brazil)*; Cyrus Cooper (University of Southampton, Southampton, UK)*;
1367 Tara C Coppinger (Munster Technological University, Cork, Ireland)*; Eva Corpeleijn (University
1368 of Groningen, Groningen, The Netherlands)*; Lilia Yadira Cortés (Pontificia Universidad
1369 Javeriana, Bogotá, Colombia)*; Simona Costanzo (IRCCS Neuromed, Pozzilli, Italy)*;
1370 Dominique Cotel (Institut Pasteur de Lille, Lille, France)*; Chris Cowell (University of Sydney,
1371 Sydney, New South Wales, Australia)*; Cora L Craig (Canadian Fitness and Lifestyle Research
1372 Institute, Ottawa, Ontario, Canada)*; Amelia C Crampin (Malawi Epidemiology and Intervention
1373 Research Unit, Lilongwe, Malawi)*; Amanda Cross (Imperial College London, London, UK)*;
1374 Ana B Crujeiras (CIBEROBN, Madrid, Spain)*; Juan J Cruz (Universidad Autónoma de Madrid
1375 CIBERESP, Madrid, Spain)*; Tamás Csányi (Hungarian School Sport Federation, Budapest,
1376 Hungary)*; Semánová Csilla (University of Debrecen, Debrecen, Hungary)*; Alexandra M Cucu
1377 (National Institute of Public Health, Bucharest, Romania; University of Medicine and Pharmacy,
1378 Bucharest, Romania)*; Liufu Cui (Kailuan General Hospital, Tangshan, China)*; Felipe V
1379 Cureau (Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil)*; Sarah Cuschieri
1380 (University of Malta, Msida, Malta)*; Ewelina Czenczek-Lewandowska (University of Rzeszów,
1381 Rzeszów, Poland)*; Graziella D'Arrigo (National Research Council, Reggio Calabria, Italy)*;

1382 Eleonora d’Orsi (Federal University of Santa Catarina, Florianópolis, Brazil)*; Liliana Dacica
1383 (Eftimie Murgu University Resita, Resita, Romania)*; Jean Dallongeville (Institut Pasteur de
1384 Lille, Lille, France)*; Albertino Damasceno (Eduardo Mondlane University, Maputo,
1385 Mozambique)*; Camilla T Damsgaard (University of Copenhagen, Copenhagen, Denmark)*;
1386 Rachel Dankner (The Gertner Institute for Epidemiology and Health Policy Research, Ramat
1387 Gan, Israel)*; Thomas M Dantoft (Bispebjerg and Frederiksberg Hospital, Copenhagen,
1388 Denmark)*; Parasmani Dasgupta (Indian Statistical Institute, Kolkata, India)*; Saeed Dastgiri
1389 (Tabriz Health Services Management Research Center, Tabriz, Iran)*; Luc Dauchet (University
1390 of Lille, Lille, France; Lille University Hospital, Lille, France)*; Kairat Davletov (Al-Farabi Kazakh
1391 National University, Almaty, Kazakhstan)*; Guy De Backer (Ghent University, Ghent, Belgium)*;
1392 Dirk De Bacquer (Ghent University, Ghent, Belgium)*; Amalia De Curtis (IRCCS Neuromed,
1393 Pozzilli, Italy)*; Patrícia de Fragas Hinnig (Federal University of Santa Catarina, Florianópolis,
1394 Brazil)*; Giovanni de Gaetano (IRCCS Neuromed, Pozzilli, Italy)*; Stefaan De Henauw (Ghent
1395 University, Ghent, Belgium)*; Pilar De Miguel-Etayo (University of Zaragoza, Zaragoza, Spain)*;
1396 Paula Duarte de Oliveira (Federal University of Pelotas, Pelotas, Brazil)*; David De Ridder
1397 (Geneva University Hospitals, Geneva, Switzerland)*; Karin De Ridder (Sciensano, Brussels,
1398 Belgium)*; Susanne R de Rooij (University Medical Centers, Amsterdam, The Netherlands;
1399 University of Amsterdam, Amsterdam, The Netherlands)*; Delphine De Smedt (Ghent
1400 University, Ghent, Belgium)*; Mohan Deepa (Madras Diabetes Research Foundation, Chennai,
1401 India)*; Alexander D Deev (National Research Centre for Preventive Medicine, Moscow,
1402 Russia)*; Vincent Jr DeGennaro (Innovating Health International, Port-au-Prince, Haiti)*; Hélène
1403 Delisle (University of Montreal, Montreal, Québec, Canada)*; Francis Delpuech (French
1404 National Research Institute for Sustainable Development, Montpellier, France)*; Stefaan
1405 Demarest (Sciensano, Brussels, Belgium)*; Elaine Dennison (University of Southampton,
1406 Southampton, UK)*; Katarzyna Dereń (University of Rzeszów, Rzeszów, Poland)*; Valérie
1407 Deschamps (French Public Health Agency, St Maurice, France)*; Meghnath Dhimal (Nepal

1408 Health Research Council, Kathmandu, Nepal)*; Augusto F Di Castelnuovo (Mediterranea
1409 Cardiocentro, Naples, Italy)*; Juvenal Soares Dias-da-Costa (Universidade do Vale do Rio dos
1410 Sinos, São Leopoldo, Brazil)*; María Elena Díaz-Sánchez (National Institute of Hygiene,
1411 Epidemiology and Microbiology, Havana, Cuba)*; Alejandro Diaz (National Council of Scientific
1412 and Technical Research, Buenos Aires, Argentina)*; Pedro Díaz Fernández (Servicio Canario
1413 de la Salud del Gobierno de Canarias, Santa Cruz de Tenerife, Spain)*; María Pilar Díez
1414 Ripollés (Consejería de Salud del Gobierno de La Rioja, Logroño, Spain)*; Zivka Dika
1415 (University of Zagreb, Zagreb, Croatia)*; Shirin Djalalinia (Ministry of Health and Medical
1416 Education, Tehran, Iran)*; Visnja Djordjic (University of Novi Sad, Novi Sad, Serbia)*; Ha TP Do
1417 (National Institute of Nutrition, Hanoi, Vietnam)*; Annette J Dobson (University of Queensland,
1418 Brisbane, Queensland, Australia)*; Liria Dominguez (Instituto de Investigación Nutricional, Lima,
1419 Peru)*; Maria Benedetta Donati (IRCCS Neuromed, Pozzilli, Italy)*; Chiara Donfrancesco
1420 (Istituto Superiore di Sanità, Rome, Italy)*; Guanghui Dong (Sun Yat-sen University,
1421 Guangzhou, China)*; Yanhui Dong (Peking University, Beijing, China)*; Silvana P Donoso
1422 (Universidad de Cuenca, Cuenca, Ecuador)*; Angela Döring (Helmholtz Zentrum München,
1423 Munich, Germany)*; Maria Dorobantu (Carol Davila University of Medicine and Pharmacy,
1424 Bucharest, Romania)*; Ahmad Reza Dorosty (Tehran University of Medical Sciences, Tehran,
1425 Iran)*; Kouamelan Doua (Ministère de la Santé et de l'Hygiène Publique, Abidjan, Côte
1426 d'Ivoire)*; Nico Dragano (University Hospital Düsseldorf, Düsseldorf, Germany)*; Wojciech
1427 Drygas (National Institute of Cardiology, Warsaw, Poland; Medical University of Lodz, Lodz,
1428 Poland)*; Jia Li Duan (Beijing Center for Disease Prevention and Control, Beijing, China)*;
1429 Charmaine A Duante (Food and Nutrition Research Institute, Taguig, Philippines)*; Priscilla
1430 Duboz (IRL 3189 ESS, Marseille, France)*; Vesselka L Duleva (National Centre of Public Health
1431 and Analyses, Sofia, Bulgaria)*; Virginija Dulskiene (Lithuanian University of Health Sciences,
1432 Kaunas, Lithuania)*; Samuel C Dumith (Federal University of Rio Grande, Rio Grande, Brazil)*;
1433 Anar Dushpanova (Scuola Superiore Sant'Anna, Pisa, Italy; Al-Farabi Kazakh National

1434 University, Almaty, Kazakhstan)*; Azhar Dyussupova (Semey Medical University, Semey,
1435 Kazakhstan)*; Vilnis Dzerve (University of Latvia, Riga, Latvia)*; Elzbieta Dzikowska-
1436 Zaborszczyk (Medical University of Lodz, Lodz, Poland)*; Ghaderi Ebrahim (Kurdistan
1437 University of Medical Sciences, Sanandaj, Iran)*; Guadalupe Echeverría (Pontificia Universidad
1438 Católica de Chile, Santiago, Chile)*; Ricky Eddie (Ministry of Health and Medical Services, Gizo,
1439 Solomon Islands)*; Ebrahim Eftekhari (Hormozgan University of Medical Sciences, Bandar
1440 Abbas, Iran)*; Eruke E Egbagbe (University of Benin, Benin City, Nigeria)*; Robert Eggertsen
1441 (University of Gothenburg, Gothenburg, Sweden)*; Sareh Eghtesad (Tehran University of
1442 Medical Sciences, Tehran, Iran)*; Gabriele Eiben (University of Skövde, Skövde, Sweden)*; Ulf
1443 Ekelund (Norwegian School of Sport Sciences, Oslo, Norway)*; Mohammad El-Khateeb
1444 (National Center for Diabetes, Endocrinology and Genetics, Amman, Jordan)*; Laila El Ammari
1445 (Ministry of Health, Rabat, Morocco)*; Jalila El Ati (National Institute of Nutrition and Food
1446 Technology, Tunis, Tunisia)*; Denise Eldemire-Shearer (The University of the West Indies,
1447 Kingston, Jamaica)*; Marie Eliassen (Bispebjerg and Frederiksberg Hospital, Copenhagen,
1448 Denmark)*; Paul Elliott (Imperial College London, London, UK)*; Ronit Endevelt (University of
1449 Haifa, Haifa, Israel; Ministry of Health, Jerusalem, Israel)*; Reina Engle-Stone (University of
1450 California Davis, Davis, CA, USA)*; Rajiv T Erasmus (University of Stellenbosch, Cape Town,
1451 South Africa)*; Raimund Erbel (University of Duisburg-Essen, Duisburg, Germany)*; Cihangir
1452 Erem (Karadeniz Technical University, Trabzon, Turkey)*; Gul Ergor (Dokuz Eylul University,
1453 Izmir, Turkey)*; Louise Eriksen (University of Southern Denmark, Copenhagen, Denmark)*;
1454 Johan G Eriksson (University of Helsinki, Helsinki, Finland)*; Jorge Escobedo-de la Peña
1455 (Instituto Mexicano del Seguro Social, Mexico City, Mexico)*; Saeid Eslami (Mashhad University
1456 of Medical Sciences, Mashhad, Iran)*; Ali Esmaeili (Rafsanjan University of Medical Sciences,
1457 Rafsanjan, Iran)*; Alun Evans (Queen's University of Belfast, Belfast, UK)*; David Faeh
1458 (University of Zurich, Zurich, Switzerland)*; Albina A Fakhretdinova (Ufa Eye Research Institute,
1459 Ufa, Russia)*; Caroline H Fall (University of Southampton, Southampton, UK)*; Elnaz Faramarzi

1460 (Tabriz University of Medical Sciences, Tabriz, Iran)*; Mojtaba Farjam (Fasa University of
1461 Medical Sciences, Fasa, Iran)*; Victoria Farrugia Sant'Angelo (Primary Health Care, Floriana,
1462 Malta)*; Mohammad Reza Fattahi (Shiraz University of Medical Sciences, Shiraz, Iran)*; Asher
1463 Fawwad (Baqai Medical University, Karachi, Pakistan)*; Wafaie W Fawzi (Harvard TH Chan
1464 School of Public Health, Boston, MA, USA)*; Edit Feigl (National Institute of Pharmacy and
1465 Nutrition, Budapest, Hungary)*; Francisco J Felix-Redondo (Centro de Salud Villanueva Norte,
1466 Badajoz, Spain)*; Trevor S Ferguson (The University of the West Indies, Kingston, Jamaica)*;
1467 Romulo A Fernandes (Universidade Estadual Paulista, Presidente Prudente, Brazil)*; Daniel
1468 Fernández-Bergés (Hospital Don Benito-Villanueva de la Serena, Badajoz, Spain)*; Daniel
1469 Ferrante (Ministry of Health, Buenos Aires, Argentina)*; Thomas Ferrao (Statistics Canada,
1470 Ottawa, Ontario, Canada)*; Gerson Ferrari (Universidad de Santiago de Chile, Santiago,
1471 Chile)*; Marika Ferrari (Council for Agricultural Research and Economics, Rome, Italy)*; Marco
1472 M Ferrario (University of Insubria, Varese, Italy)*; Catterina Ferreccio (Pontificia Universidad
1473 Católica de Chile, Santiago, Chile)*; Haroldo S Ferreira (Federal University of Alagoas, Alagoas,
1474 Brazil)*; Eldridge Ferrer (Food and Nutrition Research Institute, Taguig, Philippines)*; Jean
1475 Ferrieres (Toulouse University School of Medicine, Toulouse, France)*; Thamara Hubler
1476 Figueiró (Federal University of Santa Catarina, Florianópolis, Brazil)*; Anna Fijalkowska
1477 (Institute of Mother and Child, Warsaw, Poland)*; Mauro Fisberg (Hospital Infantil Sabará, São
1478 Paulo, Brazil)*; Krista Fischer (University of Tartu, Tartu, Estonia)*; Leng Huat Foo (Universiti
1479 Sains Malaysia, Kelantan, Malaysia)*; Maria Forsner (Umeå University, Umeå, Sweden)*; Heba
1480 M Fouad (World Health Organization Regional Office for the Eastern Mediterranean, Cairo,
1481 Egypt)*; Damian K Francis (The University of the West Indies, Kingston, Jamaica)*; Maria do
1482 Carmo Franco (Federal University of São Paulo, São Paulo, Brazil)*; Zlatko Fras (University
1483 Clinical Centre Ljubljana, Ljubljana, Slovenia)*; Nuwaha Fred (Makerere University School of
1484 Public Health, Kampala, Uganda)*; Guillermo Frontera (Hospital Universitario Son Espases,
1485 Palma, Spain)*; Flavio D Fuchs (Hospital de Clinicas de Porto Alegre, Porto Alegre, Brazil)*;

1486 Sandra C Fuchs (Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil)*; Isti I Fujiati
1487 (Universitas Sumatera Utara, Medan, Indonesia)*; Yuki Fujita (Kindai University, Osaka-
1488 Sayama, Japan)*; Matsuda Fumihiko (Kyoto University, Kyoto, Japan)*; Viktoriya Furdela (I.
1489 Horbachevsky Ternopil National Medical University, Ternopil, Ukraine)*; Takuro Furusawa
1490 (Kyoto University, Kyoto, Japan)*; Zbigniew Gaciong (Medical University of Warsaw, Warsaw,
1491 Poland)*; Mihai Gafencu (Victor Babes University of Medicine and Pharmacy, Timisoara,
1492 Romania)*; Manuel Galán Cuesta (Consejería de Sanidad del Gobierno de Cantabria,
1493 Santander, Spain)*; Andrzej Galbarczyk (Jagiellonian University Medical College, Kraków,
1494 Poland)*; Henrike Galenkamp (University of Amsterdam, Amsterdam, The Netherlands)*;
1495 Daniela Galeone (Ministero della Salute DG Prevenzione Sanitaria, Rome, Italy)*; Myriam Galfo
1496 (Council for Agricultural Research and Economics, Rome, Italy)*; Fabio Galvano (University of
1497 Catania, Catania, Italy)*; Jingli Gao (Kailuan General Hospital, Tangshan, China)*; Pei Gao
1498 (Peking University, Beijing, China)*; Manoli Garcia-de-la-Hera (CIBERESP, Madrid, Spain)*;
1499 María José García Mérida (Servicio Canario de la Salud del Gobierno de Canarias, Santa Cruz
1500 de Tenerife, Spain)*; Marta García Solano (Agencia Española de Seguridad Alimentaria y
1501 Nutrición, Madrid, Spain)*; Dickman Gareta (Africa Health Research Institute, Mtubatuba, South
1502 Africa)*; Sarah P Garnett (University of Sydney, Sydney, New South Wales, Australia)*; Jean-
1503 Michel Gaspoz (Geneva University Medical School, Geneva, Switzerland)*; Magda Gasull
1504 (CIBERESP, Madrid, Spain)*; Adroaldo Cesar Araujo Gaya (Universidade Federal do Rio
1505 Grande do Sul, Porto Alegre, Brazil)*; Anelise Reis Gaya (Universidade Federal do Rio Grande
1506 do Sul, Porto Alegre, Brazil)*; Andrea Gazzinelli (Universidade Federal de Minas Gerais, Belo
1507 Horizonte, Brazil)*; Ulrike Gehring (Utrecht University, Utrecht, The Netherlands)*; Harald
1508 Geiger (Agency for Preventive and Social Medicine, Bregenz, Austria)*; Johanna M Geleijnse
1509 (Wageningen University, Wageningen, The Netherlands)*; Ronnie George (Medical Research
1510 Foundation, Chennai, India)*; Ali Ghanbari (Non-Communicable Diseases Research Center,
1511 Tehran, Iran)*; Erfan Ghasemi (Non-Communicable Diseases Research Center, Tehran, Iran)*;

1512 Oana-Florentina Gheorghe-Fronea (Carol Davila University of Medicine and Pharmacy,
1513 Bucharest, Romania)*; Alessandro Gialluisi (University of Insubria, Varese, Italy)*; Simona
1514 Giampaoli (Istituto Superiore di Sanità, Rome, Italy)*; Francesco Gianfagna (University of
1515 Insubria, Varese, Italy; Mediterranea Cardiocentro, Naples, Italy)*; Christian Gieger (Helmholtz
1516 Zentrum München, Munich, Germany)*; Tiffany K Gill (University of Adelaide, Adelaide, South
1517 Australia, Australia)*; Jonathan Giovannelli (University of Lille, Lille, France; Lille University
1518 Hospital, Lille, France)*; Glen Gironella (Food and Nutrition Research Institute, Taguig,
1519 Philippines)*; Aleksander Giwercman (Lund University, Lund, Sweden)*; Konstantinos Gkiouras
1520 (Aristotle University of Thessaloniki, Thessaloniki, Greece)*; Natalya Glushkova (Al-Farabi
1521 Kazakh National University, Almaty, Kazakhstan)*; Natalja Glušková (National Institute for
1522 Health Development, Tallinn, Estonia)*; Ramesh Godara (Central University of Kerala,
1523 Kasaragod, India)*; Justyna Godos (University of Catania, Catania, Italy)*; Sibel Gogen
1524 (Ministry of Health, Ankara, Turkey)*; Marcel Goldberg (Institut National de la Santé et de la
1525 Recherche Médicale, Paris, France; Paris University, Paris, France)*; David Goltzman (McGill
1526 University, Montreal, Québec, Canada)*; Georgina Gómez (Universidad de Costa Rica, San
1527 José, Costa Rica)*; Jesús Humberto Gómez Gómez (Instituto Murciano de Investigación
1528 Biosanitaria Virgen de la Arrixaca, Murcia, Spain)*; Luis F Gomez (Pontificia Universidad
1529 Javeriana, Bogotá, Colombia)*; Santiago F Gómez (Gasol Foundation, Sant Boi de Llobregat,
1530 Spain; University of Lleida, Sant Boi de Llobregat, Spain)*; Aleksandra Gomula (PASs Hirszfild
1531 Institute of Immunology and Experimental Therapy, Wroclaw, Poland)*; Bruna Gonçalves
1532 Cordeiro da Silva (Federal University of Pelotas, Pelotas, Brazil)*; Helen Gonçalves (Federal
1533 University of Pelotas, Pelotas, Brazil)*; Mauer Gonçalves (University Agostinho Neto, Luanda,
1534 Angola)*; Ana D González-Alvarez (Kansas State University, Manhattan, KS, USA)*; David A
1535 Gonzalez-Chica (University of Adelaide, Adelaide, South Australia, Australia)*; Esther M
1536 González-Gil (University of Zaragoza, Zaragoza, Spain)*; Marcela Gonzalez-Gross (Universidad
1537 Politécnica de Madrid, Madrid, Spain)*; Margot González-Leon (Instituto Mexicano del Seguro

1538 Social, Mexico City, Mexico)*; Juan P González-Rivas (International Clinical Research Center,
1539 Brno, Czech Republic)*; Clicerio González-Villalpando (National Institute of Public Health,
1540 Cuernavaca, Mexico)*; María-Elena González-Villalpando (Centro de Estudios en Diabetes
1541 A.C., Mexico City, Mexico)*; Angel R Gonzalez (Universidad Autónoma de Santo Domingo,
1542 Santo Domingo, Dominican Republic)*; Frederic Gottrand (University of Lille, Lille, France)*;
1543 Antonio Pedro Graça (Ministry of Health, Lisbon, Portugal)*; Sidsel Graff-Iversen (Norwegian
1544 Institute of Public Health, Oslo, Norway)*; Dušan Grafnetter (Institute for Clinical and
1545 Experimental Medicine, Prague, Czech Republic)*; Aneta Grajda (Children's Memorial Health
1546 Institute, Warsaw, Poland)*; Maria G Grammatikopoulou (International Hellenic University,
1547 Thessaloniki, Greece)*; Ronald D Gregor (Dalhousie University, Halifax, Nova Scotia,
1548 Canada)*; Maria João Gregório (Ministry of Health, Lisbon, Portugal)*; Else Karin Grøholt
1549 (Norwegian Institute of Public Health, Oslo, Norway)*; Anders Grøntved (University of Southern
1550 Denmark, Odense, Denmark)*; Giuseppe Grosso (University of Catania, Catania, Italy)*;
1551 Gabriella Gruden (University of Turin, Turin, Italy)*; Dongfeng Gu (National Center of
1552 Cardiovascular Diseases, Beijing, China)*; Viviana Guajardo (International Life Science
1553 Institute, Buenos Aires, Argentina)*; Emanuela Gualdi-Russo (University of Ferrara, Ferrara,
1554 Italy)*; Pilar Guallar-Castillón (Universidad Autónoma de Madrid CIBERESP, Madrid, Spain)*;
1555 Andrea Gualtieri (Authority Sanitaria San Marino, San Marino, San Marino)*; Elias F
1556 Gudmundsson (Icelandic Heart Association, Kopavogur, Iceland)*; Vilmundur Gudnason
1557 (University of Iceland, Reykjavik, Iceland)*; Ramiro Guerrero (Universidad Icesi, Cali,
1558 Colombia)*; Idris Guessous (Geneva University Hospitals, Geneva, Switzerland)*; Andre L
1559 Guimaraes (State University of Montes Claros, Montes Claros, Brazil)*; Martin C Gulliford
1560 (King's College London, London, UK)*; Johanna Gunnlaugsdottir (Icelandic Heart Association,
1561 Kopavogur, Iceland)*; Marc J Gunter (International Agency for Research on Cancer, Lyon,
1562 France)*; Xiu-Hua Guo (Capital Medical University, Beijing, China)*; Yin Guo (Capital Medical
1563 University Beijing Tongren Hospital, Beijing, China)*; Prakash C Gupta (Healis-Sekhsaria

1564 Institute for Public Health, Navi Mumbai, India)*; Rajeev Gupta (Eternal Heart Care Centre and
1565 Research Institute, Jaipur, India)*; Oye Gureje (University of Ibadan, Ibadan, Nigeria)*; Enrique
1566 Gutiérrez González (Agencia Española de Seguridad Alimentaria y Nutrición, Madrid, Spain)*;
1567 Laura Gutierrez (Institute for Clinical Effectiveness and Health Policy, Buenos Aires,
1568 Argentina)*; Felix Gutzwiller (University of Zurich, Zurich, Switzerland)*; Xinyi Gwee (National
1569 University of Singapore, Singapore, Singapore)*; Seongjun Ha (National Health Insurance
1570 Service, Wonju, Republic of Korea)*; Farzad Hadaegh (Prevention of Metabolic Disorders
1571 Research Center, Tehran, Iran)*; Charalambos A Hadjigeorgiou (Research and Education
1572 Institute of Child Health, Nicosia, Cyprus)*; Rosa Haghshenas (Non-Communicable Diseases
1573 Research Center, Tehran, Iran)*; Hamid Hakimi (Rafsanjan University of Medical Sciences,
1574 Rafsanjan, Iran)*; Jytte Halkjær (Danish Cancer Society Research Center, Copenhagen,
1575 Denmark)*; Ian R Hambleton (The University of the West Indies, Cave Hill, Barbados)*; Behrooz
1576 Hamzeh (Kermanshah University of Medical Sciences, Kermanshah, Iran)*; Willem A Hanekom
1577 (Africa Health Research Institute, Durban, South Africa)*; Dominique Hange (University of
1578 Gothenburg, Gothenburg, Sweden)*; Abu AM Hanif (BRAC James P Grant School of Public
1579 Health, Dhaka, Bangladesh)*; Sari Hantunen (University of Eastern Finland, Kuopio, Finland)*;
1580 Carla Menêses Hardman (Federal University of Pernambuco, Recife, Brazil)*; Rachakulla Hari
1581 Kumar (ICMR - National Institute of Nutrition, Hyderabad, India)*; Tina Harmer Lassen (National
1582 Institute of Public Health, Copenhagen, Denmark)*; Javad Harooni (Yasuj University of Medical
1583 Sciences, Yasuj, Iran)*; Seyed Mohammad Hashemi-Shahri (Zahedan University of Medical
1584 Sciences, Zahedan, Iran)*; Maria Hassapidou (International Hellenic University, Thessaloniki,
1585 Greece)*; Jun Hata (Kyushu University, Fukuoka, Japan)*; Teresa Haugsgjerd (University of
1586 Bergen, Bergen, Norway)*; Alison J Hayes (University of Sydney, Sydney, New South Wales,
1587 Australia)*; Jiang He (Tulane University, New Orleans, LA, USA)*; Yuan He (National Research
1588 Institute for Health and Family Planning, Beijing, China)*; Yuna He (Chinese Center for Disease
1589 Control and Prevention, Beijing, China)*; Regina Heidinger-Felső (University of Pécs, Pécs,

1590 Hungary)*; Margit Heier (Helmholtz Zentrum München, Munich, Germany)*; Tatjana Hejgaard
1591 (Danish Health Authority, Copenhagen, Denmark)*; Marleen Elisabeth Hendriks (Joep Lange
1592 Institute, Amsterdam, The Netherlands)*; Rafael dos Santos Henrique (Federal University of
1593 Pernambuco, Recife, Brazil)*; Ana Henriques (Institute of Public Health of the University of
1594 Porto, Porto, Portugal)*; Leticia Hernandez Cadena (National Institute of Public Health,
1595 Cuernavaca, Mexico)*; Sauli Herrala (Oulu University Hospital, Oulu, Finland)*; Marianella
1596 Herrera-Cuenca (Universidad Central de Venezuela, Caracas, Venezuela)*; Victor M Herrera
1597 (Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia)*; Isabelle Herter-Aeberli
1598 (ETH Zurich, Zurich, Switzerland)*; Karl-Heinz Herzig (University of Oulu, Oulu, Finland; Oulu
1599 University Hospital, Oulu, Finland)*; Ramin Heshmat (Chronic Diseases Research Center,
1600 Tehran, Iran)*; Barbara Heude (Paris University, Paris, France)*; Allan G Hill (University of
1601 Southampton, Southampton, UK)*; Sai Yin Ho (University of Hong Kong, Hong Kong, China)*;
1602 Suzanne C Ho (The Chinese University of Hong Kong, Hong Kong, China)*; Michael Hobbs
1603 (University of Western Australia, Perth, Western Australia, Australia)*; Doroteia A Höfelmann
1604 (Universidade Federal do Paraná, Curitiba, Brazil)*; Michelle Holdsworth (French National
1605 Research Institute for Sustainable Development, Montpellier, France)*; Reza Homayounfar
1606 (Shahid Beheshti University of Medical Sciences, Tehran, Iran)*; Clara Homs (Gasol
1607 Foundation, Sant Boi de Llobregat, Spain; University Ramon Llull, Sant Boi de Llobregat,
1608 Spain)*; Wilma M Hopman (Kingston Health Sciences Centre, Kingston, Ontario, Canada)*;
1609 Andrea RVR Horimoto (University of São Paulo, São Paulo, Brazil)*; Claudia M Hormiga
1610 (Fundación Oftalmológica de Santander, Bucaramanga, Colombia)*; Bernardo L Horta (Federal
1611 University of Pelotas, Pelotas, Brazil)*; Leila Houti (University Oran 1, Oran, Algeria)*; Christina
1612 Howitt (The University of the West Indies, Cave Hill, Barbados)*; Thein Thein Htay (Independent
1613 Public Health Specialist, Nay Pyi Taw, Myanmar)*; Aung Soe Htet (Ministry of Health and
1614 Sports, Nay Pyi Taw, Myanmar)*; Maung Maung Than Htike (Ministry of Health and Sports, Nay
1615 Pyi Taw, Myanmar)*; Yonghua Hu (Peking University, Beijing, China)*; José María Huerta

1616 (CIBERESP, Madrid, Spain)*; Ilpo Tapani Huhtaniemi (Imperial College London, London, UK)*;
1617 Laetitia Huiart (Santé publique France, Strassen, Luxembourg)*; Constanta Huidumac Petrescu
1618 (National Institute of Public Health, Bucharest, Romania)*; Martijn Huisman (VU University
1619 Medical Center, Amsterdam, The Netherlands)*; Abdullatif Hussein (Birzeit University, Birzeit,
1620 State of Palestine)*; Chinh Nguyen Huu (National Institute of Nutrition, Hanoi, Vietnam)*; Inge
1621 Huybrechts (International Agency for Research on Cancer, Lyon, France)*; Nahla Hwalla
1622 (American University of Beirut, Beirut, Lebanon)*; Jolanda Hyska (Institute of Public Health,
1623 Tirana, Albania)*; Licia Iacoviello (IRCCS Neuromed, Pozzilli, Italy; University of Insubria,
1624 Varese, Italy)*; Jesús M Ibarluzea (CIBERESP, Madrid, Spain)*; Mohsen M Ibrahim (Cairo
1625 University, Cairo, Egypt)*; Norazizah Ibrahim Wong (Ministry of Health, Kuala Lumpur,
1626 Malaysia)*; M Arfan Ikram (Erasmus Medical Center Rotterdam, Rotterdam, The Netherlands)*;
1627 Fakhradiyev Ildar (Kazakh National Medical University, Almaty, Kazakhstan)*; Carmen Iñiguez
1628 (Universitat de València, Valencia, Spain)*; Violeta Iotova (Medical University Varna, Varna,
1629 Bulgaria)*; Vilma E Irazola (Institute for Clinical Effectiveness and Health Policy, Buenos Aires,
1630 Argentina)*; Takafumi Ishida (The University of Tokyo, Tokyo, Japan)*; Godsent C Isiguzo (Alex
1631 Ekwueme Federal University Teaching Hospital, Abakaliki, Nigeria)*; Muhammad Islam (The
1632 Hospital for Sick Children, Toronto, Ontario, Canada)*; Sheikh Mohammed Shariful Islam
1633 (Deakin University, Geelong, Victoria, Australia)*; Duygu Islek (Emory University, Atlanta, GA,
1634 USA)*; Ivaila Y Ivanova-Pandourska (Bulgarian Academy of Sciences, Sofia, Bulgaria)*;
1635 Masanori Iwasaki (Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan)*; Tuija
1636 Jääskeläinen (Finnish Institute for Health and Welfare, Helsinki, Finland)*; Rod T Jackson
1637 (University of Auckland, Auckland, New Zealand)*; Jeremy M Jacobs (Hadassah University
1638 Medical Center, Jerusalem, Israel)*; Michel Jadoul (Université Catholique de Louvain, Brussels,
1639 Belgium)*; Tazeen Jafar (Duke-NUS Medical School, Singapore, Singapore)*; Bakary Jallow
1640 (Gambia National Nutrition Agency, Banjul, The Gambia)*; Kenneth James (The University of
1641 the West Indies, Kingston, Jamaica)*; Kazi M Jamil (Kuwait Institute for Scientific Research,

1642 Safat, Kuwait)*; Konrad Jamrozik (University of Adelaide, Adelaide, South Australia, Australia;
1643 deceased)*; Anna Jansson (Public Health Agency of Sweden, Solna, Sweden)*; Imre Janszky
1644 (Norwegian University of Science and Technology, Trondheim, Norway)*; Edward Janus
1645 (University of Melbourne, Melbourne, Victoria, Australia)*; Juel Jarani (Sports University of
1646 Tirana, Tirana, Albania)*; Marjo-Riitta Jarvelin (Imperial College London, London, UK; University
1647 of Oulu, Oulu, Finland)*; Grazyna Jasienska (Jagiellonian University Medical College, Kraków,
1648 Poland)*; Ana Jelaković (University Hospital Center Zagreb, Zagreb, Croatia)*; Bojan Jelaković
1649 (University of Zagreb, Zagreb, Croatia)*; Garry Jennings (Heart Foundation, Melbourne,
1650 Victoria, Australia)*; Chao Qiang Jiang (Guangzhou 12th Hospital, Guangzhou, China)*; Ramon
1651 O Jimenez (Universidad Eugenio Maria de Hostos, Santo Domingo, Dominican Republic)*; Karl-
1652 Heinz Jöckel (University of Duisburg-Essen, Duisburg, Germany)*; Michel Joffres (Simon Fraser
1653 University, Burnaby, British Columbia, Canada)*; Jari J Jokelainen (Oulu University Hospital,
1654 Oulu, Finland)*; Jost B Jonas (Institute of Molecular and Clinical Ophthalmology Basel, Basel,
1655 Switzerland)*; Jitendra Jonnagaddala (University of New South Wales, Sydney, New South
1656 Wales, Australia)*; Torben Jørgensen (Bispebjerg and Frederiksberg Hospital, Copenhagen,
1657 Denmark)*; Pradeep Joshi (World Health Organization Country Office, Delhi, India)*; Josipa
1658 Josipović (University Hospital Center Zagreb, Zagreb, Croatia)*; Farahnaz Joukar (Guilan
1659 University of Medical Sciences, Rasht, Iran)*; Jacek J Józwiak (University of Opole, Opole,
1660 Poland)*; Debra S Judge (University of Western Australia, Perth, Western Australia, Australia)*;
1661 Anne Juolevi (Finnish Institute for Health and Welfare, Helsinki, Finland)*; Gregor Jurak
1662 (University of Ljubljana, Ljubljana, Slovenia)*; Iulia Jurca Simina (Victor Babes University of
1663 Medicine and Pharmacy, Timisoara, Romania)*; Vesna Juresa (University of Zagreb, Zagreb,
1664 Croatia)*; Rudolf Kaaks (German Cancer Research Center, Heidelberg, Germany)*; Felix O
1665 Kaducu (Gulu University, Gulu, Uganda)*; Anthony Kafatos (University of Crete, Heraklion,
1666 Greece)*; Mónika Kaj (Hungarian School Sport Federation, Budapest, Hungary)*; Eero O
1667 Kajantie (Finnish Institute for Health and Welfare, Helsinki, Finland)*; Natia Kakutia (National

1668 Center for Disease Control and Public Health, Tbilisi, Georgia)*; Daniela Kallayová (Ministry of
1669 Health, Bratislava, Slovakia)*; Zhanna Kalamatayeva (Al-Farabi Kazakh National University,
1670 Almaty, Kazakhstan)*; Ofra Kalter-Leibovici (The Gertner Institute for Epidemiology and Health
1671 Policy Research, Ramat Gan, Israel)*; Yves Kameli (French National Research Institute for
1672 Sustainable Development, Montpellier, France)*; Freja B Kampmann (Bispebjerg and
1673 Frederiksberg Hospital, Copenhagen, Denmark)*; Kodanda R Kanala (Sri Venkateswara
1674 University, Tirupati, India)*; Srinivasan Kannan (Sree Chitra Tirunal Institute for Medical
1675 Sciences and Technology, Trivandrum, India)*; Efthymios Kapantais (Hellenic Medical
1676 Association for Obesity, Athens, Greece)*; Eva Karaglani (Harokopio University, Athens,
1677 Greece)*; Argyro Karakosta (National and Kapodistrian University of Athens, Athens, Greece)*;
1678 Line L Kårhus (Bispebjerg and Frederiksberg Hospital, Copenhagen, Denmark)*; Khem B Karki
1679 (Maharajgunj Medical Campus, Kathmandu, Nepal)*; Philippe B Katchunga (Université
1680 Catholique de Bukavu, Bukavu, DR Congo)*; Marzieh Katibeh (Aarhus University, Aarhus,
1681 Denmark)*; Joanne Katz (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD,
1682 USA)*; Peter T Katzmarzyk (Pennington Biomedical Research Center, Baton Rouge, LA,
1683 USA)*; Jussi Kauhanen (University of Eastern Finland, Kuopio, Finland)*; Prabhdeep Kaur
1684 (National Institute of Epidemiology, Chennai, India)*; Maryam Kavousi (Erasmus Medical Center
1685 Rotterdam, Rotterdam, The Netherlands)*; Gylli M Kazakbaeva (Ufa Eye Research Institute,
1686 Ufa, Russia)*; François F Kaze (University of Yaoundé 1, Yaoundé, Cameroon)*; Calvin Ke
1687 (University of Toronto, Toronto, Ontario, Canada)*; Ulrich Keil (University of Münster, Münster,
1688 Germany)*; Lital Keinan Boker (Israel Center for Disease Control, Ramat Gan, Israel)*; Sirkka
1689 Keinänen-Kiukaanniemi (Oulu University Hospital, Oulu, Finland)*; Roya Kelishadi (Research
1690 Institute for Primordial Prevention of Non-communicable Disease, Isfahan, Iran)*; Cecily
1691 Kelleher (University College Dublin, Dublin, Ireland)*; Han CG Kemper (Amsterdam UMC Public
1692 Health Research Institute, Amsterdam, The Netherlands)*; Maryam Keramati (Mashhad
1693 University of Medical Sciences, Mashhad, Iran)*; Alina Kerimkulova (Kyrgyz State Medical

1694 Academy, Bishkek, Kyrgyzstan)*; Mathilde Kersting (Research Institute of Child Nutrition,
1695 Dortmund, Germany)*; Timothy Key (University of Oxford, Oxford, UK)*; Yousef Saleh Khader
1696 (Jordan University of Science and Technology, Irbid, Jordan)*; Arsalan Khaledifar (Shahrekord
1697 University of Medical Sciences, Shahrekord, Iran)*; Davood Khalili (Shahid Beheshti University
1698 of Medical Sciences, Tehran, Iran)*; Kay-Tee Khaw (University of Cambridge, Cambridge, UK)*;
1699 Bahareh Kheiri (Shahid Beheshti University of Medical Sciences, Tehran, Iran)*; Motahareh
1700 Kheradmand (Mazandaran University of Medical Sciences, Sari, Iran)*; Alireza Khosravi
1701 (Hypertension Research Center, Isfahan, Iran)*; Ilse MSL Khouw (FrieslandCampina,
1702 Amersfoort, The Netherlands)*; Ursula Kiechl-Kohlendorfer (Medical University of Innsbruck,
1703 Innsbruck, Austria)*; Sophia J Kiechl (VASCage, Innsbruck, Austria)*; Stefan Kiechl (Medical
1704 University of Innsbruck, Innsbruck, Austria; VASCage, Innsbruck, Austria)*; Japhet Killewo
1705 (Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania)*; Hyeon Chang
1706 Kim (Yonsei University College of Medicine, Seoul, Republic of Korea)*; Jeongseon Kim
1707 (National Cancer Center, Goyang-si, Republic of Korea)*; Jenny M Kindblom (University of
1708 Gothenburg, Gothenburg, Sweden; Sahlgrenska University Hospital, Gothenburg, Sweden)*;
1709 Andrew Kingston (Newcastle University, Newcastle, UK)*; Heidi Klakk (University College South
1710 Denmark, Haderslev, Denmark)*; Magdalena Klimek (Jagiellonian University Medical College,
1711 Kraków, Poland)*; Jeannette Klimont (Statistics Austria, Vienna, Austria)*; Jurate Klumbiene
1712 (Lithuanian University of Health Sciences, Kaunas, Lithuania)*; Michael Knoflach (Medical
1713 University of Innsbruck, Innsbruck, Austria)*; Bhawesh Koirala (B P Koirala Institute of Health
1714 Sciences, Dharan, Nepal)*; Elin Kolle (Norwegian School of Sport Sciences, Oslo, Norway)*;
1715 Patrick Kolsteren (Ghent University, Ghent, Belgium)*; Jürgen König (University of Vienna,
1716 Vienna, Austria)*; Raija Korpelainen (University of Oulu, Oulu, Finland)*; Paul Korrovits (Tartu
1717 University Clinics, Tartu, Estonia)*; Magdalena Korzycka (Institute of Mother and Child,
1718 Warsaw, Poland)*; Jelena Kos (University Hospital Center Zagreb, Zagreb, Croatia)*; Seppo
1719 Koskinen (Finnish Institute for Health and Welfare, Helsinki, Finland)*; Katsuyasu Kouda

1720 (Kansai Medical University, Hirakata, Japan)*; Éva Kovács (District Department of State Public
1721 Health Service, Hildburghausen, Germany)*; Viktoria Anna Kovacs (Hungarian School Sport
1722 Federation, Budapest, Hungary)*; Irina Kovalskys (Pontificia Universidad Católica Argentina,
1723 Buenos Aires, Argentina)*; Sudhir Kowlessur (Ministry of Health and Wellness, Port Louis,
1724 Mauritius)*; Slawomir Koziel (PASs Hirsfeld Institute of Immunology and Experimental
1725 Therapy, Wroclaw, Poland)*; Jana Kratenova (National Institute of Public Health, Prague, Czech
1726 Republic)*; Wolfgang Kratzer (University Hospital Ulm, Ulm, Germany)*; Vilma Kriaucioniene
1727 (Lithuanian University of Health Sciences, Kaunas, Lithuania)*; Susi Kriemler (University of
1728 Zurich, Zurich, Switzerland)*; Peter Lund Kristensen (University of Southern Denmark, Odense,
1729 Denmark)*; Helena Krizan (Croatian Institute of Public Health, Zagreb, Croatia)*; Maria F
1730 Kroker-Lobos (Instituto de Nutrición de Centro América y Panamá, Guatemala City,
1731 Guatemala)*; Steinar Krokstad (Norwegian University of Science and Technology, Trondheim,
1732 Norway)*; Daan Kromhout (University of Groningen, Groningen, The Netherlands)*; Herculina S
1733 Kruger (North-West University, Potchefstroom, South Africa; South African Medical Research
1734 Council, Potchefstroom, South Africa)*; Ruan Kruger (North-West University, Potchefstroom,
1735 South Africa)*; Łukasz Kryst (University of Physical Education, Kraków, Poland)*; Ruzena
1736 Kubinova (National Institute of Public Health, Prague, Czech Republic)*; Renata Kuciene
1737 (Lithuanian University of Health Sciences, Kaunas, Lithuania)*; Urho M Kujala (University of
1738 Jyväskylä, Jyväskylä, Finland)*; Enisa Kujundzic (Institute of Public Health, Podgorica,
1739 Montenegro)*; Zbigniew Kulaga (Children's Memorial Health Institute, Warsaw, Poland)*; R
1740 Krishna Kumar (Amrita Institute of Medical Sciences, Cochin, India)*; Marie Kunešová (Institute
1741 of Endocrinology, Prague, Czech Republic)*; Pawel Kurjata (National Institute of Cardiology,
1742 Warsaw, Poland)*; Yadlapalli S Kusuma (All India Institute of Medical Sciences, New Delhi,
1743 India)*; Vladimir Kutsenko (National Medical Research Centre for Therapy and Preventive
1744 Medicine, Moscow, Russia)*; Kari Kuulasmaa (Finnish Institute for Health and Welfare, Helsinki,
1745 Finland)*; Catherine Kyobutungi (African Population and Health Research Center, Nairobi,

1746 Kenya)*; Quang Ngoc La (Hanoi University of Public Health, Hanoi, Vietnam)*; Fatima Zahra
1747 Laamiri (Hassan First University of Settat, Settat, Morocco)*; Carl Lachat (Ghent University,
1748 Ghent, Belgium)*; Karl J Lackner (Johannes Gutenberg University, Mainz, Germany)*; Youcef
1749 Laid (Ministry of Health, Algiers, Algeria)*; Lachmie Lall (Ministry of Health, Georgetown,
1750 Guyana)*; Tai Hing Lam (University of Hong Kong, Hong Kong, China)*; Maritza Landaeta
1751 Jimenez (Universidad Central de Venezuela, Caracas, Venezuela)*; Edwige Landais (French
1752 National Research Institute for Sustainable Development, Montpellier, France)*; Vera Lanska
1753 (Institute for Clinical and Experimental Medicine, Prague, Czech Republic)*; Georg Lappas
1754 (Sahlgrenska Academy, Gothenburg, Sweden)*; Bagher Larijani (Endocrinology and
1755 Metabolism Research Center, Tehran, Iran)*; Simo Pone Larissa (Clinical Research Education,
1756 Networking & Consultancy, Douala, Cameroon)*; Tint Swe Latt (University of Public Health,
1757 Yangon, Myanmar)*; Martino Laurenzi (Centro Studi Epidemiologici di Gubbio, Gubbio, Italy)*;
1758 Laura Lauria (Istituto Superiore di Sanità, Rome, Italy)*; Maria Lazo-Porras (Universidad
1759 Peruana Cayetano Heredia, Lima, Peru)*; Gwenaëlle Le Coroller (Luxembourg Institute of
1760 Health, Strassen, Luxembourg)*; Khanh Le Nguyen Bao (National Institute of Nutrition, Hanoi,
1761 Vietnam)*; Agnès Le Port (French National Research Institute for Sustainable Development,
1762 Montpellier, France)*; Tuyen D Le (National Institute of Nutrition, Hanoi, Vietnam)*; Jeannette
1763 Lee (National University of Singapore, Singapore, Singapore; National University Health
1764 System, Singapore, Singapore)*; Jeonghee Lee (National Cancer Center, Goyang-si, Republic
1765 of Korea)*; Paul H Lee (University of Leicester, Leicester, UK)*; Nils Lehmann (University of
1766 Duisburg-Essen, Duisburg, Germany)*; Terho Lehtimäki (Tampere University Hospital,
1767 Tampere, Finland; Tampere University, Tampere, Finland)*; Daniel Lemogoum (University of
1768 Douala, Douala, Cameroon)*; Branimir Leskošek (University of Ljubljana, Ljubljana, Slovenia)*;
1769 Justyna Leszczak (University of Rzeszów, Rzeszów, Poland)*; Gabriel M Leung (University of
1770 Hong Kong, Hong Kong, China)*; Naomi S Levitt (University of Cape Town, Cape Town, South
1771 Africa)*; Yanping Li (Harvard TH Chan School of Public Health, Boston, MA, USA)*; Merike

1772 Liivak (National Institute for Health Development, Tallinn, Estonia)*; Christa L Lilly (West
1773 Virginia University, Morgantown, WV, USA)*; Charlie Lim (National University of Singapore,
1774 Singapore, Singapore; National University Health System, Singapore, Singapore)*; Wei-Yen
1775 Lim (National University of Singapore, Singapore, Singapore; National University Health
1776 System, Singapore, Singapore)*; M Fernanda Lima-Costa (Oswaldo Cruz Foundation Rene
1777 Rachou Research Institute, Belo Horizonte, Brazil)*; Hsien-Ho Lin (National Taiwan University,
1778 Taipei, Taiwan)*; Xu Lin (Shanghai Institute of Nutrition and Health of Chinese Academy of
1779 Sciences, Shanghai, China)*; Yi-Ting Lin (Uppsala University, Uppsala, Sweden)*; Lars Lind
1780 (Uppsala University, Uppsala, Sweden)*; Vijaya Lingam (Medical Research Foundation,
1781 Chennai, India)*; Birgit Linkohr (Helmholtz Zentrum München, Munich, Germany)*; Allan
1782 Linneberg (Bispebjerg and Frederiksberg Hospital, Copenhagen, Denmark)*; Lauren Lissner
1783 (University of Gothenburg, Gothenburg, Sweden)*; Mieczyslaw Litwin (Children's Memorial
1784 Health Institute, Warsaw, Poland)*; Jing Liu (Capital Medical University Beijing An Zhen
1785 Hospital, Beijing, China)*; Lijuan Liu (Capital Medical University Beijing Tongren Hospital,
1786 Beijing, China)*; Wei-Cheng Lo (Taipei Medical University, Taipei, Taiwan)*; Helle-Mai Loit
1787 (National Institute for Health Development, Tallinn, Estonia)*; Khuong Quynh Long (Hanoi
1788 University of Public Health, Hanoi, Vietnam)*; Guadalupe Longo Abril (Servicio Andaluz de
1789 Salud, Sevilla, Spain)*; Luis Lopes (University of Porto, Porto, Portugal)*; Marcus VV Lopes
1790 (Federal University of Santa Catarina, Florianópolis, Brazil)*; Oscar Lopes (Sports Medical
1791 Center of Minho, Braga, Portugal)*; Esther Lopez-Garcia (Universidad Autónoma de Madrid
1792 CIBERESP, Madrid, Spain)*; Tania Lopez (Universidad San Martín de Porres, Lima, Peru)*;
1793 Paulo A Lotufo (University of São Paulo, São Paulo, Brazil)*; José Eugenio Lozano (Consejería
1794 de Sanidad Junta de Castilla y León, Valladolid, Spain)*; Janice L Lukrafka (Universidade
1795 Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, Brazil)*; Dalia Luksiene
1796 (Lithuanian University of Health Sciences, Kaunas, Lithuania)*; Annamari Lundqvist (Finnish
1797 Institute for Health and Welfare, Helsinki, Finland)*; Nuno Lunet (University of Porto, Porto,

1798 Portugal)*; Charles Lunogelo (Ilembula Lutheran Hospital, Ilembula, Tanzania)*; Michala
1799 Lustigová (Charles University, Prague, Czech Republic; National Institute of Public Health,
1800 Prague, Czech Republic)*; Edyta Łuszczki (University of Rzeszów, Rzeszów, Poland)*; Jean-
1801 René M'Buyamba-Kabangu (University of Kinshasa Hospital, Kinshasa, DR Congo)*;
1802 Guansheng Ma (Peking University, Beijing, China)*; Xu Ma (National Research Institute for
1803 Health and Family Planning, Beijing, China)*; George LL Machado-Coelho (Universidade
1804 Federal de Ouro Preto, Ouro Preto, Brazil)*; Aristides M Machado-Rodrigues (University of
1805 Coimbra, Coimbra, Portugal)*; Enguerran Macia (IRL 3189 ESS, Marseille, France)*; Luisa M
1806 Macieira (Coimbra University Hospital Center, Coimbra, Portugal)*; Ahmed A Madar (University
1807 of Oslo, Oslo, Norway)*; Gladys E Maestre (University of Texas Rio Grande Valley, Harlingen,
1808 TX, USA)*; Stefania Maggi (Institute of Neuroscience of the National Research Council, Padua,
1809 Italy)*; Dianna J Magliano (Baker Heart and Diabetes Institute, Melbourne, Victoria, Australia)*;
1810 Sara Magnacca (Mediterranea Cardiocentro, Naples, Italy)*; Emmanuella Magriplis (Agricultural
1811 University of Athens, Athens, Greece)*; Gowri Mahasampath (Christian Medical College Vellore,
1812 Vellore, India)*; Bernard Maire (French National Research Institute for Sustainable
1813 Development, Montpellier, France)*; Marjeta Majer (University of Zagreb, Zagreb, Croatia)*;
1814 Marcia Makdisse (Hospital Israelita Albert Einstein, São Paulo, Brazil)*; Päivi Mäki (Finnish
1815 Institute for Health and Welfare, Helsinki, Finland)*; Fatemeh Malekzadeh (Tehran University of
1816 Medical Sciences, Tehran, Iran)*; Reza Malekzadeh (Shiraz University of Medical Sciences,
1817 Shiraz, Iran; Tehran University of Medical Sciences, Tehran, Iran)*; Rahul Malhotra (Duke-NUS
1818 Medical School, Singapore, Singapore)*; Kodavanti Mallikharjuna Rao (ICMR - National Institute
1819 of Nutrition, Hyderabad, India)*; Sofia K Malyutina (SB RAS Federal Research Center Institute
1820 of Cytology and Genetics, Novosibirsk, Russia)*; Lynell V Maniego (Food and Nutrition
1821 Research Institute, Taguig, Philippines)*; Yannis Manios (Harokopio University, Athens,
1822 Greece)*; Masimango Imani Manix (Université Catholique de Bukavu, Bukavu, DR Congo)*; Jim
1823 I Mann (University of Otago, Dunedin, New Zealand)*; Fariborz Mansour-Ghanaei (Guilan

1824 University of Medical Sciences, Rasht, Iran)*; Taru Manyanga (University of Northern British
1825 Columbia, Prince George, British Columbia, Canada)*; Enzo Manzato (University of Padua,
1826 Padua, Italy)*; Anie Marcil (Statistics Canada, Ottawa, Ontario, Canada)*; Paula Margozzini
1827 (Pontificia Universidad Católica de Chile, Santiago, Chile)*; Anastasia Markaki (Hellenic
1828 Mediterranean University, Siteia, Greece)*; Oonagh Markey (Loughborough University,
1829 Loughborough, UK)*; Eliza Markidou Ioannidou (Ministry of Health, Nicosia, Cyprus)*; Pedro
1830 Marques-Vidal (Lausanne University Hospital, Lausanne, Switzerland; University of Lausanne,
1831 Lausanne, Switzerland)*; Larissa Pruner Marques (Escola Nacional de Saúde Pública Sergio
1832 Arouca, Rio de Janeiro, Brazil)*; Jaume Marrugat (CIBERCV, Barcelona, Spain; Institut Hospital
1833 del Mar d'Investigacions Mèdiques, Barcelona, Spain)*; Yves Martin-Prevel (French National
1834 Research Institute for Sustainable Development, Montpellier, France)*; Rosemarie Martin (Mary
1835 Immaculate College, Limerick, Ireland)*; Reynaldo Martorell (Emory University, Atlanta, GA,
1836 USA)*; Eva Martos (Hungarian Society of Sports Medicine, Budapest, Hungary)*; Katharina
1837 Maruszczak (Paracelsus Medical University, Salzburg, Austria)*; Stefano Marventano
1838 (University of Catania, Catania, Italy)*; Giovanna Masala (Institute for Cancer Research,
1839 Prevention and Clinical Network, Florence, Italy)*; Luis P Mascarenhas (Universidade Estadual
1840 do Centro-Oeste, Guarapuava, Brazil)*; Shariq R Masoodi (Sher-i-Kashmir Institute of Medical
1841 Sciences, Srinagar, India)*; Ellisiv B Mathiesen (UiT The Arctic University of Norway, Tromsø,
1842 Norway)*; Prashant Mathur (ICMR - National Centre for Disease Informatics and Research,
1843 Bengaluru, India)*; Alicia Matijasevich (University of São Paulo, São Paulo, Brazil)*; Piotr
1844 Matłosz (University of Rzeszów, Rzeszów, Poland)*; Tandi E Matsha (Cape Peninsula
1845 University of Technology, Cape Town, South Africa)*; Victor Matsudo (Centro de Estudos do
1846 Laboratório de Aptidão Física de São Caetano do Sul, São Paulo, Brazil)*; Christina
1847 Mavrogianni (Harokopio University, Athens, Greece)*; Artur Mazur (University of Rzeszów,
1848 Rzeszów, Poland)*; Jean Claude N Mbanya (University of Yaoundé 1, Yaoundé, Cameroon)*;
1849 Shelly R McFarlane (The University of the West Indies, Kingston, Jamaica)*; Stephen T

1850 McGarvey (Brown University, Providence, RI, USA)*; Martin McKee (London School of Hygiene
1851 & Tropical Medicine, London, UK)*; Stela McLachlan (University of Edinburgh, Edinburgh, UK)*;
1852 Rachael M McLean (University of Otago, Dunedin, New Zealand)*; Scott B McLean (Statistics
1853 Canada, Ottawa, Ontario, Canada)*; Margaret L McNairy (Weill Cornell Medicine, New York
1854 City, NY, USA)*; Breige A McNulty (University College Dublin, Dublin, Ireland)*; Sounnia
1855 Mediene Benchekor (University Oran 1, Oran, Algeria)*; Jurate Medzioniene (Lithuanian
1856 University of Health Sciences, Kaunas, Lithuania)*; Parinaz Mehdipour (Non-Communicable
1857 Diseases Research Center, Tehran, Iran)*; Kirsten Mehlig (University of Gothenburg,
1858 Gothenburg, Sweden)*; Amir Houshang Mehrparvar (Shahid Sadoughi University of Medical
1859 Sciences, Yazd, Iran)*; Aline Meirhaeghe (Institut National de la Santé et de la Recherche
1860 Médicale, Lille, France)*; Jørgen Meisfjord (Norwegian Institute of Public Health, Oslo,
1861 Norway)*; Christa Meisinger (Helmholtz Zentrum München, Munich, Germany)*; Jesus D
1862 Melgarejo (KU Leuven, Leuven, Belgium)*; Marina Melkumova (Arabkir Medical Centre-Institute
1863 of Child and Adolescent Health, Yerevan, Armenia)*; João Mello (Universidade Federal do Rio
1864 Grande do Sul, Porto Alegre, Brazil)*; Fabián Méndez (Universidad del Valle, Cali, Colombia)*;
1865 Carlos O Mendivil (Universidad de los Andes, Bogotá, Colombia)*; Ana Maria B Menezes
1866 (Federal University of Pelotas, Pelotas, Brazil)*; Geetha R Menon (ICMR - National Institute of
1867 Medical Statistics, New Delhi, India)*; Gert BM Mensink (Robert Koch Institute, Berlin,
1868 Germany)*; Maria Teresa Menzano (Ministero della Salute DG Prevenzione Sanitaria, Rome,
1869 Italy)*; Indrapal I Meshram (ICMR - National Institute of Nutrition, Hyderabad, India)*; Diane T
1870 Meto (University of Abidjan, Abidjan, Côte d'Ivoire)*; Haakon E Meyer (University of Oslo, Oslo,
1871 Norway)*; Jie Mi (Capital Institute of Pediatrics, Beijing, China)*; Kim F Michaelsen (University
1872 of Copenhagen, Copenhagen, Denmark)*; Nathalie Michels (Ghent University, Ghent,
1873 Belgium)*; Kairit Mikkel (University of Tartu, Tartu, Estonia)*; Karolina Miłkowska (Jagiellonian
1874 University Medical College, Kraków, Poland)*; Jody C Miller (University of Otago, Dunedin, New
1875 Zealand)*; Olga Milushkina (Pirogov Russian National Research Medical University, Moscow,

1876 Russia)*; Cláudia S Minderico (Universidade de Lisboa, Lisbon, Portugal)*; GK Mini (Women's
1877 Social and Health Studies Foundation, Trivandrum, India)*; Juan Francisco Miquel (Pontificia
1878 Universidad Católica de Chile, Santiago, Chile)*; J Jaime Miranda (Universidad Peruana
1879 Cayetano Heredia, Lima, Peru)*; Mohammad Reza Mirjalili (Shahid Sadoughi University of
1880 Medical Sciences, Yazd, Iran)*; Daphne Mirkopoulou (Democritus University, Alexandroupolis,
1881 Greece)*; Erkin Mirrakhimov (Kyrgyz State Medical Academy, Bishkek, Kyrgyzstan)*; Marjeta
1882 Mišigoj-Duraković (University of Zagreb, Zagreb, Croatia)*; Antonio Mistretta (University of
1883 Catania, Catania, Italy)*; Veronica Mocanu (Grigore T Popa University of Medicine and
1884 Pharmacy, Iasi, Romania)*; Pietro A Modesti (Università degli Studi di Firenze, Florence, Italy)*;
1885 Sahar Saeedi Moghaddam (Non-Communicable Diseases Research Center, Tehran, Iran)*;
1886 Bahram Mohajer (Non-Communicable Diseases Research Center, Tehran, Iran)*; Mostafa K
1887 Mohamed (Ain Shams University, Cairo, Egypt)*; Shukri F Mohamed (African Population and
1888 Health Research Center, Nairobi, Kenya)*; Kazem Mohammad (Tehran University of Medical
1889 Sciences, Tehran, Iran)*; Mohammad Reza Mohammadi (Tehran University of Medical
1890 Sciences, Tehran, Iran)*; Zahra Mohammadi (Tehran University of Medical Sciences, Tehran,
1891 Iran)*; Noushin Mohammadifard (Isfahan Cardiovascular Research Center, Isfahan, Iran)*;
1892 Reza Mohammadpourhodki (Mashhad University of Medical Sciences, Mashhad, Iran)*;
1893 Viswanathan Mohan (Madras Diabetes Research Foundation, Chennai, India)*; Salim Mohanna
1894 (Universidad Peruana Cayetano Heredia, Lima, Peru)*; Muhammad Fadhli Mohd Yusoff
1895 (Ministry of Health, Kuala Lumpur, Malaysia)*; Iraj Mohebbi (Urmia University of Medical
1896 Sciences, Urmia, Iran)*; Farnam Mohebi (University of California Berkeley, Berkeley, CA,
1897 USA)*; Marie Moitry (University of Strasbourg, Strasbourg, France; Strasbourg University
1898 Hospital, Strasbourg, France)*; Line T Møllehave (Bispebjerg and Frederiksberg Hospital,
1899 Copenhagen, Denmark)*; Niels C Møller (University of Southern Denmark, Odense, Denmark)*;
1900 Dénes Molnár (University of Pécs, Pécs, Hungary)*; Amirabbas Momenan (Shahid Beheshti
1901 University of Medical Sciences, Tehran, Iran)*; Charles K Mondo (Mulago Hospital, Kampala,

1902 Uganda)*; Roger A Montenegro Mendoza (Instituto Conmemorativo Gorgas de Estudios de la
1903 Salud, Panama City, Panama)*; Eric Monterrubio-Flores (National Institute of Public Health,
1904 Cuernavaca, Mexico)*; Kotsedi Daniel K Monyeki (University of Limpopo, Sovenga, South
1905 Africa)*; Jin Soo Moon (Seoul National University, Seoul, Republic of Korea)*; Mahmood
1906 Moosazadeh (Mazandaran University of Medical Sciences, Sari, Iran)*; Hermine T Mopa
1907 (University of Yaoundé 1, Yaoundé, Cameroon)*; Farhad Moradpour (Kurdistan University of
1908 Medical Sciences, Sanandaj, Iran)*; Leila B Moreira (Universidade Federal do Rio Grande do
1909 Sul, Porto Alegre, Brazil)*; Alain Morejon (University of Medical Sciences of Cienfuegos,
1910 Cienfuegos, Cuba)*; Luis A Moreno (University of Zaragoza, Zaragoza, Spain; CIBEROBN,
1911 Zaragoza, Spain)*; Francis Morey (Ministry of Health and Wellness, Belmopan, Belize)*; Karen
1912 Morgan (Royal College of Surgeons in Ireland, Dublin, Ireland)*; Suzanne N Morin (McGill
1913 University, Montreal, Québec, Canada)*; Erik Lykke Mortensen (University of Copenhagen,
1914 Copenhagen, Denmark)*; George Moschonis (La Trobe University, Melbourne, Victoria,
1915 Australia)*; Alireza Moslem (Sabzevar University Of Medical Sciences, Sabzevar, Iran)*;
1916 Malgorzata Mossakowska (International Institute of Molecular and Cell Biology, Warsaw,
1917 Poland)*; Aya Mostafa (Ain Shams University, Cairo, Egypt)*; Seyed-Ali Mostafavi (Tehran
1918 University of Medical Sciences, Tehran, Iran)*; Anabela Mota-Pinto (University of Coimbra,
1919 Coimbra, Portugal)*; Jorge Mota (University of Porto, Porto, Portugal)*; Mohammad Esmaeel
1920 Motlagh (Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran)*; Jorge Motta
1921 (Instituto Conmemorativo Gorgas de Estudios de la Salud, Panama City, Panama)*; Marcos
1922 André Moura-dos-Santos (University of Pernambuco, Recife, Brazil)*; Yeva Movsesyan (Arabkir
1923 Medical Centre-Institute of Child and Adolescent Health, Yerevan, Armenia)*; Kelias P
1924 Msyamboza (World Health Organization Country Office, Lilongwe, Malawi)*; Thet Thet Mu
1925 (Department of Public Health, Nay Pyi Taw, Myanmar)*; Magdalena Muc (University of
1926 Coimbra, Coimbra, Portugal)*; Florian Muca (Albanian Sports Science Association, Tirana,
1927 Albania)*; Boban Mugoša (Institute of Public Health, Podgorica, Montenegro)*; Maria L Muiesan

1928 (University of Brescia, Brescia, Italy)*; Kulimbet Mukhtar (Al-Farabi Kazakh National University,
1929 Almaty, Kazakhstan)*; Martina Müller-Nurasyid (Johannes Gutenberg University, Mainz,
1930 Germany)*; Thomas Münzel (Johannes Gutenberg University, Mainz, Germany)*; Jaakko Mursu
1931 (University of Eastern Finland, Kuopio, Finland)*; Elaine M Murtagh (University of Limerick,
1932 Limerick, Ireland)*; Kamarul Imran Musa (Universiti Sains Malaysia, Kelantan, Malaysia)*; Sanja
1933 Musić Milanović (Croatian Institute of Public Health, Zagreb, Croatia; University of Zagreb,
1934 Zagreb, Croatia)*; Vera Musil (University of Zagreb, Zagreb, Croatia)*; Geoffrey Musinguzi
1935 (Makerere University School of Public Health, Kampala, Uganda)*; Marie-Claire Muyer
1936 (University de Kinshasa, Kinshasa, DR Congo)*; Iraj Nabipour (Bushehr University of Medical
1937 Sciences, Bushehr, Iran)*; Shohreh Naderimagham (Non-Communicable Diseases Research
1938 Center, Tehran, Iran)*; Gabriele Nagel (Ulm University, Ulm, Germany)*; Farid Najafi
1939 (Kermanshah University of Medical Sciences, Kermanshah, Iran)*; Harunobu Nakamura (Kobe
1940 University, Kobe, Japan)*; Hanna Nalecz (Institute of Mother and Child, Warsaw, Poland)*; Jana
1941 Námešná (Regional Authority of Public Health, Banska Bystrica, Slovakia)*; Ei Ei K Nang
1942 (National University of Singapore, Singapore, Singapore; National University Health System,
1943 Singapore, Singapore)*; Vinay B Nangia (Suraj Eye Institute, Nagpur, India)*; Martin Nankap
1944 (UNICEF, Yaoundé, Cameroon)*; Sameer Narake (Healis-Sekhsaria Institute for Public Health,
1945 Navi Mumbai, India)*; Paola Nardone (Istituto Superiore di Sanità, Rome, Italy)*; Take Naseri
1946 (Ministry of Health, Apia, Samoa)*; Matthias Nauck (University Medicine Greifswald, Greifswald,
1947 Germany)*; William A Neal (West Virginia University, Morgantown, WV, USA)*; Azim
1948 Nejatizadeh (Hormozgan University of Medical Sciences, Bandar Abbas, Iran)*; Chandini
1949 Nekkanti (University of New South Wales, Sydney, New South Wales, Australia)*; Keiu Nelis
1950 (National Institute for Health Development, Tallinn, Estonia)*; Ilona Nenko (Jagiellonian
1951 University Medical College, Kraków, Poland)*; Martin Neovius (Karolinska Institutet, Stockholm,
1952 Sweden)*; Flavio Nervi (Pontificia Universidad Católica de Chile, Santiago, Chile)*; Tze Pin Ng
1953 (National University of Singapore, Singapore, Singapore)*; Chung T Nguyen (National Institute

1954 of Hygiene and Epidemiology, Hanoi, Vietnam)*; Nguyen D Nguyen (University of Medicine and
1955 Pharmacy at Ho Chi Minh City, Ho Chi Minh City, Vietnam)*; Quang Ngoc Nguyen (Hanoi
1956 Medical University, Hanoi, Vietnam)*; Michael Y Ni (University of Hong Kong, Hong Kong,
1957 China)*; Rodica Nicolescu (National Institute of Public Health, Bucharest, Romania)*; Peng Nie
1958 (Xi'an Jiaotong University, Xi'an, China)*; Ramfis E Nieto-Martínez (LifeDoc Health, Memphis,
1959 TN, USA)*; Yury P Nikitin (SB RAS Federal Research Center Institute of Cytology and Genetics,
1960 Novosibirsk, Russia)*; Guang Ning (Shanghai Jiao-Tong University School of Medicine,
1961 Shanghai, China)*; Toshiharu Ninomiya (Kyushu University, Fukuoka, Japan)*; Nobuo Nishi
1962 (National Institutes of Biomedical Innovation, Health and Nutrition, Tokyo, Japan)*; Sania
1963 Nishtar (Heartfile, Islamabad, Pakistan)*; Marianna Noale (Institute of Neuroscience of the
1964 National Research Council, Padua, Italy)*; Oscar A Noboa (Universidad de la República,
1965 Montevideo, Uruguay)*; Helena Nogueira (University of Coimbra, Coimbra, Portugal)*; Maria
1966 Nordendahl (Umeå University, Umeå, Sweden)*; Børge G Nordestgaard (Copenhagen
1967 University Hospital, Copenhagen, Denmark; University of Copenhagen, Copenhagen,
1968 Denmark)*; Davide Noto (University of Palermo, Palermo, Italy)*; Natalia Nowak-Szczepanska
1969 (PASs Hirsfeld Institute of Immunology and Experimental Therapy, Wrocław, Poland)*;
1970 Mohannad Al Nsour (Eastern Mediterranean Public Health Network, Amman, Jordan)*; Irfan
1971 Nuhoğlu (Karadeniz Technical University, Trabzon, Turkey)*; Baltazar Nunes (National Institute
1972 of Health Doutor Ricardo Jorge, Lisbon, Portugal; NOVA University Lisbon, Lisbon, Portugal)*;
1973 Eha Nurk (National Institute for Health Development, Tallinn, Estonia)*; Moffat Nyirenda
1974 (London School of Hygiene & Tropical Medicine, London, UK)*; Terence W O'Neill (University of
1975 Manchester, Manchester, UK)*; Dermot O'Reilly (Queen's University of Belfast, Belfast, UK)*;
1976 Galina Obreja (State University of Medicine and Pharmacy, Chisinau, Moldova)*; Caleb
1977 Ochimana (Harvard TH Chan School of Public Health, Boston, MA, USA)*; Angélica M Ochoa-
1978 Avilés (Universidad de Cuenca, Cuenca, Ecuador)*; Eiji Oda (Tachikawa General Hospital,
1979 Nagaoka, Japan)*; Augustine N Odili (University of Abuja College of Health Sciences, Abuja,

1980 Nigeria)*; Kyungwon Oh (Korea Centers for Disease Control and Prevention, Cheongju-si,
1981 Republic of Korea)*; Kumiko Ohara (Kansai Medical University, Osaka-Sayama, Japan)*; Claes
1982 Ohlsson (University of Gothenburg, Gothenburg, Sweden; Sahlgrenska University Hospital,
1983 Gothenburg, Sweden)*; Ryutaro Ohtsuka (Japan Wildlife Research Center, Tokyo, Japan)*; Örn
1984 Olafsson (Icelandic Heart Association, Kopavogur, Iceland)*; Maria Teresa A Olinto
1985 (Universidade do Vale do Rio dos Sinos, São Leopoldo, Brazil)*; Isabel O Oliveira (Federal
1986 University of Pelotas, Pelotas, Brazil)*; Mohd Azahadi Omar (Ministry of Health, Kuala Lumpur,
1987 Malaysia)*; Saeed M Omar (Gadarif University, Gadarif, Sudan)*; Altan Onat (Istanbul
1988 University, Istanbul, Turkey; deceased)*; Sok King Ong (Ministry of Health, Bandar Seri
1989 Begawan, Brunei)*; N. Charlotte Onland-Moret (Utrecht University, Utrecht, The Netherlands)*;
1990 Lariane M Ono (Universidade Federal do Paraná, Curitiba, Brazil)*; Pedro Ordunez (Pan
1991 American Health Organization, Washington, DC, USA)*; Rui Ornelas (University of Madeira,
1992 Funchal, Portugal)*; Ana P Ortiz (University of Puerto Rico, San Juan, Puerto Rico)*; Pedro J
1993 Ortiz (Universidad Peruana Cayetano Heredia, Lima, Peru)*; Merete Osler (Bispebjerg and
1994 Frederiksberg Hospital, Copenhagen, Denmark)*; Clive Osmond (University of Southampton,
1995 Southampton, UK)*; Sergej M Ostojic (University of Novi Sad, Novi Sad, Serbia)*; Afshin
1996 Ostovar (Osteoporosis Research Center, Tehran, Iran)*; Johanna A Otero (Universidad de
1997 Santander, Bucaramanga, Colombia)*; Kim Overvad (Aarhus University, Aarhus, Denmark)*;
1998 Ellis Owusu-Dabo (Kwame Nkrumah University of Science and Technology, Kumasi, Ghana)*;
1999 Fred Michel Paccaud (Unisanté, Lausanne, Switzerland)*; Ioannis Pagkalos (International
2000 Hellenic University, Thessaloniki, Greece)*; Elena Pahomova (University of Latvia, Riga,
2001 Latvia)*; Karina Mary de Paiva (Federal University of Santa Catarina, Florianópolis, Brazil)*;
2002 Andrzej Pająk (Jagiellonian University Medical College, Kraków, Poland)*; Alberto Palloni
2003 (University of Wisconsin-Madison, Madison, WI, USA)*; Luigi Palmieri (Istituto Superiore di
2004 Sanità, Rome, Italy)*; Wen-Harn Pan (Academia Sinica, Taipei, Taiwan)*; Songhomitra Panda-
2005 Jonas (Privatpraxis Prof Jonas und Dr Panda-Jonas, Heidelberg, Germany)*; Arvind Pandey

2006 (ICMR – National Institute of Medical Statistics, New Delhi, India)*; Francesco Panza (IRCCS
2007 Ente Ospedaliero Specializzato in Gastroenterologia S. de Bellis, Bari, Italy)*; Mariela Paoli
2008 (University of the Andes, Mérida, Venezuela)*; Sousana K Papadopoulou (International Hellenic
2009 University, Thessaloniki, Greece)*; Dimitrios Papandreou (Zayed University, Abu Dhabi, United
2010 Arab Emirates)*; Rossina G Pareja (Instituto de Investigación Nutricional, Lima, Peru)*; Soon-
2011 Woo Park (Catholic University of Daegu, Daegu, Republic of Korea)*; Suyeon Park (Korea
2012 Centers for Disease Control and Prevention, Cheongju-si, Republic of Korea)*; Winsome R
2013 Parnell (University of Otago, Dunedin, New Zealand)*; Mahboubeh Parsaeian (Tehran
2014 University of Medical Sciences, Tehran, Iran)*; Ionela M Pascanu (University of Medicine,
2015 Pharmacy, Science and Technology of Târgu Mures, Târgu Mures, Romania)*; Patrick Pasquet
2016 (UMR CNRS-MNHN 7206, Paris, France)*; Nikhil D Patel (Jivandeep Hospital, Anand, India)*;
2017 Marcos Pattussi (Universidade do Vale do Rio dos Sinos, São Leopoldo, Brazil)*; Halyna
2018 Pavlyshyn (I. Horbachevsky Ternopil National Medical University, Ternopil, Ukraine)*; Raimund
2019 Pechlaner (Medical University of Innsbruck, Innsbruck, Austria)*; Ivan Pećin (University Hospital
2020 Center Zagreb, Zagreb, Croatia)*; Mangesh S Pednekar (Healis-Sekhsaria Institute for Public
2021 Health, Navi Mumbai, India)*; João M Pedro (Centro de Investigação em Saúde de Angola,
2022 Caxito, Angola)*; Nasheeta Peer (South African Medical Research Council, Durban, South
2023 Africa)*; Sergio Viana Peixoto (Oswaldo Cruz Foundation Rene Rachou Research Institute,
2024 Belo Horizonte, Brazil)*; Markku Peltonen (Finnish Institute for Health and Welfare, Helsinki,
2025 Finland)*; Alexandre C Pereira (University of São Paulo, São Paulo, Brazil)*; Marco A Peres
2026 (National Dental Care Centre Singapore, Singapore, Singapore)*; Cynthia M Pérez (University
2027 of Puerto Rico, San Juan, Puerto Rico)*; Valentina Peterkova (National Medical Research
2028 Center for Endocrinology, Moscow, Russia)*; Annette Peters (Helmholtz Zentrum München,
2029 Munich, Germany)*; Astrid Petersmann (University Medicine Greifswald, Greifswald,
2030 Germany)*; Janina Petkeviciene (Lithuanian University of Health Sciences, Kaunas, Lithuania)*;
2031 Ausra Petrauskiene (Lithuanian University of Health Sciences, Kaunas, Lithuania)*; Olga

2032 Petrovna Kovtun (Yekaterinburg State Medical Academy, Yekaterinburg, Russia)*; Emanuela
2033 Pettenuzzo (University Hospital of Varese, Varese, Italy)*; Niloofar Peykari (Ministry of Health
2034 and Medical Education, Tehran, Iran)*; Norbert Pfeiffer (Johannes Gutenberg University, Mainz,
2035 Germany)*; Modou Cheyassin Phall (Gambia National Nutrition Agency, Banjul, The Gambia)*;
2036 Son Thai Pham (Vietnam National Heart Institute, Hanoi, Vietnam)*; Rafael N Pichardo (Clínica
2037 de Medicina Avanzada Dr. Abel González, Santo Domingo, Dominican Republic)*; Daniela
2038 Pierannunzio (Istituto Superiore di Sanità, Rome, Italy)*; Iris Pigeot (Leibniz Institute for
2039 Prevention Research and Epidemiology – BIPS, Bremen, Germany)*; Hynek Pikhart (University
2040 College London, London, UK)*; Aida Pilav (University of Sarajevo, Sarajevo, Bosnia and
2041 Herzegovina)*; Lorenza Pilotto (Cardiovascular Prevention Centre Udine, Udine, Italy)*;
2042 Francesco Pistelli (University of Pisa, Pisa, Italy)*; Freda Pitakaka (Ministry of Health and
2043 Medical Services, Honiara, Solomon Islands)*; Aleksandra Piwonska (National Institute of
2044 Cardiology, Warsaw, Poland)*; Andreia N Pizarro (University of Porto, Porto, Portugal)*; Pedro
2045 Plans-Rubió (Public Health Agency of Catalonia, Barcelona, Spain)*; Alina G Platonova (O. M.
2046 Marzeyev Institute for Public Health of the National Academy of the Medical Sciences of
2047 Ukraine, Kyiv, Ukraine)*; Bee Koon Poh (Universiti Kebangsaan Malaysia, Kuala Lumpur,
2048 Malaysia)*; Hermann Pohlabein (Leibniz Institute for Prevention Research and Epidemiology –
2049 BIPS, Bremen, Germany)*; Nadija S Polka (O. M. Marzeyev Institute for Public Health of the
2050 National Academy of the Medical Sciences of Ukraine, Kyiv, Ukraine)*; Raluca M Pop
2051 (University of Medicine, Pharmacy, Science and Technology of Târgu Mures, Târgu Mures,
2052 Romania)*; Stevo R Popović (University of Montenegro, Niksic, Montenegro)*; Miquel Porta
2053 (Institut Hospital del Mar d'Investigacions Mèdiques, Barcelona, Spain)*; Georg Posch (Agency
2054 for Preventive and Social Medicine, Bregenz, Austria)*; Anil Poudyal (Nepal Health Research
2055 Council, Kathmandu, Nepal)*; Dimitrios Poulimeneas (International Hellenic University,
2056 Thessaloniki, Greece)*; Hamed Pouraram (Tehran University of Medical Sciences, Tehran,
2057 Iran)*; Farhad Pourfarzi (Ardabil University of Medical Sciences, Ardabil, Iran)*; Akram

2058 Pourshams (Tehran University of Medical Sciences, Tehran, Iran)*; Hossein Poustchi (Tehran
2059 University of Medical Sciences, Tehran, Iran)*; Rajendra Pradeepa (Madras Diabetes Research
2060 Foundation, Chennai, India)*; Alison J Price (London School of Hygiene & Tropical Medicine,
2061 London, UK)*; Jacqueline F Price (University of Edinburgh, Edinburgh, UK)*; Antonio Prista
2062 (Universidade Pedagógica, Maputo, Mozambique)*; Rui Providencia (University College
2063 London, London, UK)*; Jardena J Puder (Lausanne University Hospital, Lausanne,
2064 Switzerland)*; Iveta Pudule (Centre for Disease Prevention and Control, Riga, Latvia)*; Maria
2065 Puiu (Victor Babes University of Medicine and Pharmacy, Timisoara, Romania)*; Margus Punab
2066 (Tartu University Clinics, Tartu, Estonia)*; Muhammed S Qadir (Sulaimani Polytechnic
2067 University, Sulaymaniyah, Iraq)*; Radwan F Qasrawi (Al-Quds University, East Jerusalem, State
2068 of Palestine)*; Mostafa Qorbani (Alborz University of Medical Sciences, Karaj, Iran)*; Hedley K
2069 Quintana (Instituto Conmemorativo Gorgas de Estudios de la Salud, Panama City, Panama)*;
2070 Pedro J Quiroga-Padilla (Universidad de los Andes, Bogotá, Colombia)*; Tran Quoc Bao
2071 (Ministry of Health, Hanoi, Vietnam)*; Stefan Rach (Leibniz Institute for Prevention Research
2072 and Epidemiology – BIPS, Bremen, Germany)*; Ivana Radic (University of Novi Sad, Novi Sad,
2073 Serbia)*; Ricardas Radisauskas (Lithuanian University of Health Sciences, Kaunas, Lithuania)*;
2074 Salar Rahimkazerooni (Shiraz University of Medical Sciences, Shiraz, Iran)*; Mahfuzar Rahman
2075 (Pure Earth, Dhaka, Bangladesh)*; Mahmudur Rahman (Institute of Epidemiology Disease
2076 Control and Research, Dhaka, Bangladesh)*; Olli Raitakari (University of Turku, Turku,
2077 Finland)*; Manu Raj (Amrita Institute of Medical Sciences, Cochin, India)*; Tamerlan Rajabov
2078 (UNICEF, Baku, Azerbaijan)*; Ellina M Rakhimova (Ufa Eye Research Institute, Ufa, Russia)*;
2079 Sherali Rakhmatulloev (Ministry of Health and Social Protection, Dushanbe, Tajikistan)*; Ivo
2080 Rakovac (World Health Organization Regional Office for Europe, Moscow, Russia)*; Sudha
2081 Ramachandra Rao (National Institute of Epidemiology, Chennai, India)*; Ambady
2082 Ramachandran (India Diabetes Research Foundation, Chennai, India)*; Otim PC Ramadan
2083 (World Health Organization Country Office, Juba, South Sudan)*; Virgílio V Ramires (Instituto

2084 Federal Riograndense, Rio Grande, Brazil)*; Jacqueline Ramke (University of Auckland,
2085 Auckland, New Zealand)*; Elisabete Ramos (University of Porto Medical School, Porto,
2086 Portugal)*; Rafel Ramos (Institut Universitari d'Investigació en Atenció Primària Jordi Gol,
2087 Girona, Spain)*; Lekhraj Rampal (Universiti Putra Malaysia, Serdang, Malaysia)*; Sanjay
2088 Rampal (University of Malaya, Kuala Lumpur, Malaysia)*; Lalka S Rangelova (National Centre
2089 of Public Health and Analyses, Sofia, Bulgaria)*; Vayia Rarra (Sotiria Hospital, Athens,
2090 Greece)*; Ramon A Rascon-Pacheco (Instituto Mexicano del Seguro Social, Mexico City,
2091 Mexico)*; Cassiano Ricardo Rech (Federal University of Santa Catarina, Florianópolis, Brazil)*;
2092 Josep Redon (University of Valencia, Valencia, Spain)*; Paul Ferdinand M Reganit (University
2093 of the Philippines, Manila, Philippines)*; Valéria Regecová (Slovak Academy of Sciences,
2094 Bratislava, Slovakia)*; Jane DP Renner (University of Santa Cruz do Sul, Santa Cruz do Sul,
2095 Brazil)*; Judit A Repasy (University of Pécs, Pécs, Hungary)*; Cézane P Reuter (University of
2096 Santa Cruz do Sul, Santa Cruz do Sul, Brazil)*; Luis Revilla (Universidad San Martín de Porres,
2097 Lima, Peru)*; Abbas Rezaianzadeh (Shiraz University of Medical Sciences, Shiraz, Iran)*;
2098 Yeunsook Rho (National Health Insurance Service, Wonju, Republic of Korea)*; Lourdes Ribas-
2099 Barba (Nutrition Research Foundation, Barcelona, Spain)*; Robespierre Ribeiro (Minas Gerais
2100 State Secretariat for Health, Belo Horizonte, Brazil; deceased)*; Elio Riboli (Imperial College
2101 London, London, UK)*; Adrian Richter (University Medicine Greifswald, Greifswald, Germany)*;
2102 Fernando Rigo (CS S. Agustín Ibsalut, Palma, Spain)*; Attilio Rigotti (Pontificia Universidad
2103 Católica de Chile, Santiago, Chile)*; Natascia Rinaldo (University of Ferrara, Ferrara, Italy)*;
2104 Tobias F Rinke de Wit (Amsterdam Institute for Global Health and Development, Amsterdam,
2105 The Netherlands)*; Ana I Rito (National Institute of Health Doutor Ricardo Jorge, Lisbon,
2106 Portugal)*; Raphael M Ritti-Dias (Universidade Nove de Julho, São Paulo, Brazil)*; Juan A
2107 Rivera (National Institute of Public Health, Cuernavaca, Mexico)*; Reina G Roa (Ministerio de
2108 Salud, Panama City, Panama)*; Louise Robinson (Newcastle University, Newcastle, UK)*;
2109 Cynthia Robitaille (Public Health Agency of Canada, Ottawa, Ontario, Canada)*; Romana

2110 Roccaldo (Council for Agricultural Research and Economics, Rome, Italy)*; Daniela Rodrigues
2111 (University of Coimbra, Coimbra, Portugal)*; Fernando Rodríguez-Artalejo (Universidad
2112 Autónoma de Madrid CIBERESP, Madrid, Spain)*; María del Cristo Rodriguez-Perez (Canarian
2113 Health Service, Tenerife, Spain)*; Laura A Rodríguez-Villamizar (Universidad Industrial de
2114 Santander, Bucaramanga, Colombia)*; Andrea Y Rodríguez (Ministry of Health and Social
2115 Protection, Bogotá, Colombia)*; Ulla Roggenbuck (University of Duisburg-Essen, Duisburg,
2116 Germany)*; Peter Rohloff (Wuqu' Kawoq, Tecpan, Guatemala)*; Fabian Rohner (GroundWork,
2117 Fläsch, Switzerland)*; Rosalba Rojas-Martinez (National Institute of Public Health, Cuernavaca,
2118 Mexico)*; Nipa Rojroongwasinkul (Mahidol University, Nakhon Pathom, Thailand)*; Dora
2119 Romaguera (CIBEROBN, Madrid, Spain)*; Elisabetta L Romeo (Associazione Calabrese di
2120 Epatologia, Reggio Calabria, Italy)*; Rafaela V Rosario (University of Minho, Braga, Portugal)*;
2121 Annika Rosengren (University of Gothenburg, Gothenburg, Sweden; Sahlgrenska University
2122 Hospital, Gothenburg, Sweden)*; Ian Rouse (Fiji National University, Suva, Fiji)*; Vanessa
2123 Rouzier (GHESKIO Clinics, Port-au-Prince, Haiti)*; Joel GR Roy (Statistics Canada, Ottawa,
2124 Ontario, Canada)*; Maira H Ruano (Universidad de San Carlos, Quetzaltenango, Guatemala)*;
2125 Adolfo Rubinstein (Institute for Clinical Effectiveness and Health Policy, Buenos Aires,
2126 Argentina)*; Frank J Rühli (University of Zurich, Zurich, Switzerland)*; Jean-Bernard Ruidavets
2127 (Toulouse University School of Medicine, Toulouse, France)*; Blanca Sandra Ruiz-Betancourt
2128 (Instituto Mexicano del Seguro Social, Mexico City, Mexico)*; Maria Ruiz-Castell (Luxembourg
2129 Institute of Health, Strassen, Luxembourg)*; Emma Ruiz Moreno (National Center for
2130 Epidemiology CIBERESP, Madrid, Spain)*; Iuliia A Rusakova (Ufa Eye Research Institute, Ufa,
2131 Russia)*; Kenisha Russell Jonsson (Public Health Agency of Sweden, Solna, Sweden)*; Paola
2132 Russo (Institute of Food Sciences of the National Research Council, Avellino, Italy)*; Petra Rust
2133 (University of Vienna, Vienna, Austria)*; Marcin Rutkowski (Medical University of Gdansk,
2134 Gdansk, Poland)*; Marge Saamel (National Institute for Health Development, Tallinn, Estonia)*;
2135 Charumathi Sabanayagam (Singapore Eye Research Institute, Singapore, Singapore)*;

2136 Hamideh Sabbaghi (Shahid Beheshti University of Medical Sciences, Tehran, Iran)*; Elena
2137 Sacchini (Authority Sanitaria San Marino, San Marino, San Marino)*; Harshpal S Sachdev
2138 (Sitaram Bhartia Institute of Science and Research, New Delhi, India)*; Alireza Sadjadi (Tehran
2139 University of Medical Sciences, Tehran, Iran)*; Ali Reza Safarpour (Shiraz University of Medical
2140 Sciences, Shiraz, Iran)*; Saeid Safiri (Tabriz University of Medical Sciences, Tabriz, Iran)*;
2141 Mohammad Hossien Saghi (Sabzevar University of Medical Sciences, Sabzevar, Iran)*; Olfa
2142 Saidi (University Tunis El Manar, Tunis, Tunisia)*; Nader Saki (Ahvaz Jundishapur University of
2143 Medical Sciences, Ahvaz, Iran)*; Sanja Šalaj (University of Zagreb, Zagreb, Croatia)*; Benoit
2144 Salanave (French Public Health Agency, St Maurice, France)*; Eduardo Salazar Martinez
2145 (National Institute of Public Health, Cuernavaca, Mexico)*; Calogero Saleva (Institute for Cancer
2146 Research, Prevention and Clinical Network, Florence, Italy)*; Diego Salmerón (CIBERESP,
2147 Madrid, Spain)*; Veikko Salomaa (Finnish Institute for Health and Welfare, Helsinki, Finland)*;
2148 Jukka T Salonen (University of Helsinki, Helsinki, Finland)*; Massimo Salvetti (University of
2149 Brescia, Brescia, Italy)*; Margarita Samoutian (Kindergarten of Avlonari, Evia, Greece)*; Jose
2150 Sánchez-Abanto (National Institute of Health, Lima, Peru)*; Inés Sánchez Rodríguez (Instituto
2151 Murciano de Investigación Biosanitaria Virgen de la Arrixaca, Murcia, Spain)*; Sandjaja
2152 (Ministry of Health, Jakarta, Indonesia)*; Susana Sans (Catalan Department of Health,
2153 Barcelona, Spain)*; Loreto Santa Marina (Biodonostia Health Research Institute, San
2154 Sebastián, Spain)*; Ethel Santacruz (Ministerio de Salud Pública y Bienestar Social, Asunción,
2155 Paraguay)*; Diana A Santos (Universidade de Lisboa, Lisbon, Portugal)*; Ina S Santos (Federal
2156 University of Pelotas, Pelotas, Brazil)*; Lèlita C Santos (Coimbra University Hospital Center,
2157 Coimbra, Portugal)*; Maria Paula Santos (University of Porto, Porto, Portugal)*; Osvaldo Santos
2158 (Instituto de Saúde Ambiental, Lisbon, Portugal)*; Rute Santos (University of Porto, Porto,
2159 Portugal)*; Tamara R Santos (Federal University of Alagoas, Maceió, Brazil)*; Jouko L
2160 Saramies (South Karelia Social and Health Care District, Lappeenranta, Finland)*; Luis B
2161 Sardinha (Universidade de Lisboa, Lisbon, Portugal)*; Nizal Sarrafzadegan (Isfahan

2162 Cardiovascular Research Center, Isfahan, Iran)*; Thirunavukkarasu Sathish (Emory University,
2163 Atlanta, GA, USA)*; Kai-Uwe Saum (German Cancer Research Center, Heidelberg, Germany)*;
2164 Savvas Savva (Research and Education Institute of Child Health, Nicosia, Cyprus)*; Mathilde
2165 Savy (French National Research Institute for Sustainable Development, Montpellier, France)*;
2166 Norie Sawada (National Cancer Center, Tokyo, Japan)*; Mariana Sbaraini (Universidade
2167 Federal do Rio Grande do Sul, Porto Alegre, Brazil)*; Marcia Scazufca (University of São Paulo
2168 Clinics Hospital, São Paulo, Brazil)*; Beatriz D Schaan (Universidade Federal do Rio Grande do
2169 Sul, Porto Alegre, Brazil)*; Angelika Schaffrath Rosario (Robert Koch Institute, Berlin,
2170 Germany)*; Herman Schargrotsky (Hospital Italiano de Buenos Aires, Buenos Aires,
2171 Argentina)*; Anja Schienkiewitz (Robert Koch Institute, Berlin, Germany)*; Karin Schindler
2172 (Medical University of Vienna, Vienna, Austria)*; Sabine Schipf (University Medicine Greifswald,
2173 Greifswald, Germany)*; Carsten O Schmidt (University Medicine Greifswald, Greifswald,
2174 Germany)*; Ida Maria Schmidt (Rigshospitalet, Copenhagen, Denmark)*; Peter Schnohr
2175 (Copenhagen University Hospital, Copenhagen, Denmark)*; Ben Schöttker (German Cancer
2176 Research Center, Heidelberg, Germany)*; Sara Schramm (University of Duisburg-Essen,
2177 Duisburg, Germany)*; Stine Schramm (University of Southern Denmark, Odense, Denmark)*;
2178 Helmut Schröder (CIBERESP, Madrid, Spain)*; Constance Schultsz (Academic Medical Center
2179 of University of Amsterdam, Amsterdam, The Netherlands)*; Matthias B Schulze (German
2180 Institute of Human Nutrition Potsdam-Rehbruecke, Nuthetal, Germany)*; Aletta E Schutte
2181 (University of New South Wales, Sydney, New South Wales, Australia; The George Institute for
2182 Global Health, Sydney, New South Wales, Australia)*; Sylvain Sebert (University of Oulu, Oulu,
2183 Finland)*; Moslem Sedaghattalab (Yasuj University of Medical Sciences, Yasuj, Iran)*; Rusidah
2184 Selamat (Ministry of Health, Kuala Lumpur, Malaysia)*; Vedrana Sember (University of
2185 Ljubljana, Ljubljana, Slovenia)*; Abhijit Sen (Center for Oral Health Services and Research Mid-
2186 Norway, Trondheim, Norway)*; Idowu O Senbanjo (Lagos State University College of Medicine,
2187 Lagos, Nigeria)*; Sadaf G Sepanlou (Tehran University of Medical Sciences, Tehran, Iran)*;

2188 Guillermo Sequera (Ministerio de Salud Pública y Bienestar Social, Asunción, Paraguay)*;
2189 Victor Sequera (Ministry of Public Health, Asunción, Paraguay)*; Luis Serra-Majem (University
2190 of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain)*; Jennifer Servais
2191 (Statistics Canada, Ottawa, Ontario, Canada)*; Ľudmila Ševčíková (Comenius University,
2192 Bratislava, Slovakia)*; Svetlana Shalnova (Ministry of Healthcare, Moscow, Russia)*; Teresa
2193 Shamah-Levy (National Institute of Public Health, Cuernavaca, Mexico)*; Morteza
2194 Shamshirgaran (Neyshabur University of Medical Sciences, Neyshabur, Iran)*; Coimbatore
2195 Subramaniam Shanthirani (Madras Diabetes Research Foundation, Chennai, India)*; Maryam
2196 Sharafkhah (Tehran University of Medical Sciences, Tehran, Iran)*; Sanjib K Sharma (B P
2197 Koirala Institute of Health Sciences, Dharan, Nepal)*; Jonathan E Shaw (Baker Heart and
2198 Diabetes Institute, Melbourne, Victoria, Australia)*; Amaneh Shayanrad (Tehran University of
2199 Medical Sciences, Tehran, Iran)*; Ali Akbar Shayesteh (Ahvaz Jundishapur University of
2200 Medical Sciences, Ahvaz, Iran)*; Lela Shengelia (National Center for Disease Control and
2201 Public Health, Tbilisi, Georgia)*; Zumin Shi (Qatar University, Doha, Qatar)*; Kenji Shibuya
2202 (King's College London, London, UK)*; Hana Shimizu-Furusawa (Nippon Medical School,
2203 Tokyo, Japan)*; Tal Shimony (Ministry of Health, Ramat Gan, Israel)*; Rahman Shiri (Finnish
2204 Institute of Occupational Health, Helsinki, Finland)*; Namuna Shrestha (Public Health Promotion
2205 and Development Organization, Kathmandu, Nepal)*; Khairil Si-Ramlee (Ministry of Health,
2206 Bandar Seri Begawan, Brunei)*; Alfonso Siani (Institute of Food Sciences of the National
2207 Research Council, Avellino, Italy)*; Rosalynn Siantar (Singapore Eye Research Institute,
2208 Singapore, Singapore)*; Abla M Sibai (American University of Beirut, Beirut, Lebanon)*; Labros
2209 S Sidossis (Rutgers University, New Brunswick, NJ, USA)*; Natalia Silitrari (National Agency for
2210 Public Health, Chisinau, Moldova)*; Antonio M Silva (Federal University of Maranhão, São Luís,
2211 Brazil)*; Caroline Ramos de Moura Silva (University of Pernambuco, Recife, Brazil)*; Diego
2212 Augusto Santos Silva (Federal University of Santa Catarina, Florianópolis, Brazil)*; Kelly S Silva
2213 (Federal University of Santa Catarina, Florianópolis, Brazil)*; Xueling Sim (National University of

2214 Singapore, Singapore, Singapore; National University Health System, Singapore, Singapore)*;
2215 Mary Simon (India Diabetes Research Foundation, Chennai, India)*; Judith Simons (St
2216 Vincent's Hospital, Sydney, New South Wales, Australia)*; Leon A Simons (University of New
2217 South Wales, Sydney, New South Wales, Australia)*; Agneta Sjöberg (University of
2218 Gothenburg, Gothenburg, Sweden)*; Michael Sjöström (Karolinska Institutet, Stockholm,
2219 Sweden; deceased)*; Natalia A Skoblina (Pirogov Russian National Research Medical
2220 University, Moscow, Russia)*; Gry Skodje (Nes Municipality, Årnes, Norway)*; Tatyana
2221 Slazhnyova (National Center of Public Health, Nur-Sultan, Kazakhstan)*; Jolanta Slowikowska-
2222 Hilczer (Medical University of Lodz, Lodz, Poland)*; Przemysław Slusarczyk (International
2223 Institute of Molecular and Cell Biology, Warsaw, Poland)*; Liam Smeeth (London School of
2224 Hygiene & Tropical Medicine, London, UK)*; Hung-Kwan So (University of Hong Kong, Hong
2225 Kong, China)*; Fernanda Cunha Soares (University of Pernambuco, Recife, Brazil)*; Grzegorz
2226 Sobek (University of Rzeszów, Rzeszów, Poland)*; Eugène Sobngwi (University of Yaoundé 1,
2227 Yaoundé, Cameroon)*; Morten Sodemann (University of Southern Denmark, Odense,
2228 Denmark)*; Stefan Söderberg (Umeå University, Umeå, Sweden)*; Moesijanti YE Soekatri
2229 (Health Polytechnic Jakarta II Institute, Jakarta, Indonesia)*; Agustinus Soemantri (Diponegoro
2230 University, Semarang, Indonesia; deceased)*; Reecha Sofat (University College London,
2231 London, UK)*; Vincenzo Solfrizzi (University of Bari, Bari, Italy)*; Mohammad Hossein Somi
2232 (Tabriz University of Medical Sciences, Tabriz, Iran)*; Emily Sonestedt (Lund University, Lund,
2233 Sweden)*; Yi Song (Peking University, Beijing, China)*; Sajid Soofi (The Aga Khan University,
2234 Karachi, Pakistan)*; Thorkild IA Sørensen (University of Copenhagen, Copenhagen, Denmark)*;
2235 Elin P Sørghjerd (Norwegian University of Science and Technology, Trondheim, Norway)*;
2236 Charles Sossa Jérôme (Institut Régional de Santé Publique, Ouidah, Benin)*; Victoria E Soto-
2237 Rojas (Universidad Icesi, Cali, Colombia)*; Aïcha Soumaré (University of Bordeaux, Bordeaux,
2238 France)*; Alfonso Sousa-Poza (University of Hohenheim, Stuttgart, Germany)*; Slavica Sovic
2239 (University of Zagreb, Zagreb, Croatia)*; Bente Sparboe-Nilsen (Oslo Metropolitan University,

2240 Oslo, Norway)*; Karen Sparrenberger (Universidade Federal do Rio Grande do Sul, Porto
2241 Alegre, Brazil)*; Phoebe R Spencer (University of Western Australia, Perth, Western Australia,
2242 Australia)*; Angela Spinelli (Istituto Superiore di Sanità, Rome, Italy)*; Igor Spiroski (Institute of
2243 Public Health, Skopje, North Macedonia; Ss. Cyril and Methodius University, Skopje, North
2244 Macedonia)*; Jan A Staessen (KU Leuven, Leuven, Belgium)*; Hanspeter Stamm (Lamprecht
2245 und Stamm Sozialforschung und Beratung AG, Zurich, Switzerland)*; Kaspar Staub (University
2246 of Zurich, Zurich, Switzerland)*; Bill Stavreski (Heart Foundation, Melbourne, Victoria,
2247 Australia)*; Jostein Steene-Johannessen (Norwegian School of Sport Sciences, Oslo, Norway)*;
2248 Peter Stehle (Bonn University, Bonn, Germany)*; Aryeh D Stein (Emory University, Atlanta, GA,
2249 USA)*; George S Stergiou (National and Kapodistrian University of Athens, Athens, Greece)*;
2250 Jochanan Stessman (Hadassah University Medical Center, Jerusalem, Israel)*; Ranko
2251 Stevanović (Croatian Institute of Public Health, Zagreb, Croatia)*; Jutta Stieber (Helmholtz
2252 Zentrum München, Munich, Germany; deceased)*; Doris Stöckl (Helmholtz Zentrum München,
2253 Munich, Germany)*; Jakub Stokwiszewski (National Institute of Public Health – National Institute
2254 of Hygiene, Warsaw, Poland)*; Ekaterina Stoyanova (Kalina Malina Kindergarten, Pazardjik,
2255 Bulgaria)*; Gareth Stratton (Swansea University, Swansea, UK)*; Karien Stronks (University of
2256 Amsterdam, Amsterdam, The Netherlands)*; Maria Wany Strufaldi (Federal University of São
2257 Paulo, São Paulo, Brazil)*; Lela Sturua (National Center for Disease Control and Public Health,
2258 Tbilisi, Georgia)*; Ramón Suárez-Medina (National Institute of Hygiene, Epidemiology and
2259 Microbiology, Havana, Cuba)*; Machi Suka (The Jikei University School of Medicine, Tokyo,
2260 Japan)*; Chien-An Sun (Fu Jen Catholic University, Taipei, Taiwan)*; Liang Sun (Shanghai
2261 Institute of Nutrition and Health of Chinese Academy of Sciences, Shanghai, China)*; Malin
2262 Sund (Umeå University, Umeå, Sweden)*; Johan Sundström (Uppsala University, Uppsala,
2263 Sweden)*; Yn-Tz Sung (The Chinese University of Hong Kong, Hong Kong, China)*; Jordi
2264 Sunyer (Barcelona Institute for Global Health CIBERESP, Barcelona, Spain)*; Paibul
2265 Suriyawongpaisal (Mahidol University, Nakhon Pathom, Thailand)*; Nabil William G Sweis

2266 (University of Jordan, Amman, Jordan)*; Boyd A Swinburn (University of Auckland, Auckland,
2267 New Zealand)*; Rody G Sy (University of the Philippines, Manila, Philippines)*; René Charles
2268 Sylva (National Statistical Office, Praia, Cabo Verde)*; Moyses Szklo (Johns Hopkins
2269 Bloomberg School of Public Health, Baltimore, MD, USA)*; Lucjan Szponar (National Institute of
2270 Public Health – National Institute of Hygiene, Warsaw, Poland)*; Lorraine Tabone (Primary
2271 Health Care, Floriana, Malta)*; E Shyong Tai (National University of Singapore, Singapore,
2272 Singapore; National University Health System, Singapore, Singapore)*; Konstantinos D
2273 Tambalis (Harokopio University, Athens, Greece)*; Mari-Liis Tammesoo (University of Tartu,
2274 Tartu, Estonia)*; Abdonas Tamosiunas (Lithuanian University of Health Sciences, Kaunas,
2275 Lithuania)*; Eng Joo Tan (Deakin University, Sydney, New South Wales, Australia)*; Xun Tang
2276 (Peking University, Beijing, China)*; Maya Tanrygulyyeva (Scientific Research Institute of
2277 Maternal and Child Health, Ashgabat, Turkmenistan)*; Frank Tanser (University of Lincoln,
2278 Lincoln, UK)*; Yong Tao (Peking University, Beijing, China)*; Mohammed Rasoul Tarawneh
2279 (Ministry of Health, Amman, Jordan)*; Jakob Tarp (Aarhus University, Aarhus, Denmark)*;
2280 Carolina B Tarqui-Mamani (National Institute of Health, Lima, Peru)*; Radka Taxová
2281 Braunerová (Institute of Endocrinology, Prague, Czech Republic)*; Anne Taylor (University of
2282 Adelaide, Adelaide, South Australia, Australia)*; Julie Taylor (University College London,
2283 London, UK)*; Félicité Tchibindat (UNICEF, Niamey, Niger)*; Saskia Te Velde (University of
2284 Applied Sciences Utrecht, Utrecht, The Netherlands)*; William R Tebar (Universidade Estadual
2285 Paulista, Presidente Prudente, Brazil)*; Grethe S Tell (University of Bergen, Bergen, Norway)*;
2286 Tania Tello (Universidad Peruana Cayetano Heredia, Lima, Peru)*; Yih Chung Tham
2287 (Singapore Eye Research Institute, Singapore, Singapore)*; KR Thankappan (Central University
2288 of Kerala, Kasaragod, India)*; Holger Theobald (Karolinska Institutet, Huddinge, Sweden)*;
2289 Xenophon Theodoridis (Aristotle University of Thessaloniki, Thessaloniki, Greece)*; Nihal
2290 Thomas (Christian Medical College Vellore, Vellore, India)*; Barbara Thorand (Helmholtz
2291 Zentrum München, Munich, Germany)*; Betina H Thuesen (Bispebjerg and Frederiksberg

2292 Hospital, Copenhagen, Denmark)*; Ľubica Tichá (Comenius University, Bratislava, Slovakia)*;
2293 Erik J Timmermans (University Medical Center Utrecht, Utrecht, The Netherlands)*; Dwi H
2294 Tjandrarini (National Institute of Health Research and Development, Jakarta, Indonesia)*; Anne
2295 Tjonneland (Danish Cancer Society Research Center, Copenhagen, Denmark)*; Hanna K
2296 Tolonen (Finnish Institute for Health and Welfare, Helsinki, Finland)*; Janne S Tolstrup
2297 (University of Southern Denmark, Copenhagen, Denmark)*; Murat Topbas (Karadeniz Technical
2298 University, Trabzon, Turkey)*; Roman Topór-Mądry (Jagiellonian University Medical College,
2299 Kraków, Poland)*; Liv Elin Torheim (Oslo Metropolitan University, Oslo, Norway)*; María José
2300 Tormo (Health Service, Murcia, Spain)*; Michael J Tornaritis (Research and Education Institute
2301 of Child Health, Nicosia, Cyprus)*; Maties Torrent (Institut d'Investigació Sanitària Illes Balears,
2302 Menorca, Spain)*; Laura Torres-Collado (CIBERESP, Madrid, Spain)*; Stefania Toselli
2303 (University of Bologna, Bologna, Italy)*; Giota Touloumi (National and Kapodistrian University of
2304 Athens, Athens, Greece)*; Pierre Traissac (French National Research Institute for Sustainable
2305 Development, Montpellier, France)*; Thi Tuyet-Hanh Tran (Hanoi University of Public Health,
2306 Hanoi, Vietnam)*; Mark S Tremblay (Children's Hospital of Eastern Ontario Research Institute,
2307 Ottawa, Ontario, Canada)*; Areti Triantafyllou (Aristotle University of Thessaloniki, Thessaloniki,
2308 Greece)*; Dimitrios Trichopoulos (Harvard TH Chan School of Public Health, Boston, MA, USA;
2309 deceased)*; Antonia Trichopoulou (Hellenic Health Foundation, Athens, Greece)*; Oanh TH
2310 Trinh (University of Medicine and Pharmacy at Ho Chi Minh City, Ho Chi Minh City, Vietnam)*;
2311 Atul Trivedi (Government Medical College, Bhavnagar, India)*; Yu-Hsiang Tsao (Institute of
2312 Epidemiology and Preventive Medicine, Taipei, Taiwan)*; Lechaba Tshepo (Sefako Makgatho
2313 Health Science University, Ga-Rankuwa, South Africa)*; Maria Tsigga (International Hellenic
2314 University, Thessaloniki, Greece)*; Panagiotis Tsintavis (International Hellenic University,
2315 Thessaloniki, Greece)*; Shoichiro Tsugane (National Cancer Center, Tokyo, Japan)*; John
2316 Tuitele (Department of Health, Faga'alu, American Samoa; LBJ Hospital, Faga'alu, American
2317 Samoa)*; Azaliia M Tuliakova (Ufa Eye Research Institute, Ufa, Russia)*; Marshall K Tulloch-

2318 Reid (The University of the West Indies, Kingston, Jamaica)*; Fikru Tullu (Addis Ababa
2319 University, Addis Ababa, Ethiopia)*; Tomi-Pekka Tuomainen (University of Eastern Finland,
2320 Kuopio, Finland)*; Jaakko Tuomilehto (Finnish Institute for Health and Welfare, Helsinki,
2321 Finland)*; Maria L Turley (Ministry of Health, Wellington, New Zealand)*; Gilad Twig (The
2322 Gertner Institute for Epidemiology and Health Policy Research, Ramat Gan, Israel; Israel
2323 Defense Forces Medical Corps, Tel HaShomer, Israel)*; Per Tynelius (Karolinska Institutet,
2324 Stockholm, Sweden)*; Evangelia Tzala (Imperial College London, London, UK)*; Themistoklis
2325 Tzotzas (Hellenic Medical Association for Obesity, Athens, Greece)*; Christophe Tzourio
2326 (University of Bordeaux, Bordeaux, France)*; Peter Ueda (Karolinska Institutet, Stockholm,
2327 Sweden)*; Eunice Ugel (Universidad Centro-Occidental Lisandro Alvarado, Barquisimeto,
2328 Venezuela)*; Flora AM Ukoli (Meharry Medical College, Nashville, TN, USA)*; Hanno Ulmer
2329 (Medical University of Innsbruck, Innsbruck, Austria)*; Belgin Unal (Dokuz Eylul University,
2330 Izmir, Turkey)*; Zhamyila Usupova (Republican Center for Health Promotion, Bishkek,
2331 Kyrgyzstan)*; Hannu MT Uusitalo (University of Tampere Tays Eye Center, Tampere, Finland)*;
2332 Nalan Uysal (Sabiha Gokcen Ilkokulu, Ankara, Turkey)*; Justina Vaitkeviciute (Lithuanian
2333 University of Health Sciences, Kaunas, Lithuania)*; Gonzalo Valdivia (Pontificia Universidad
2334 Católica de Chile, Santiago, Chile)*; Susana Vale (Polytechnic Institute of Porto, Porto,
2335 Portugal)*; Ndip Valerie (University of Oxford, Oxford, UK)*; Damaskini Valvi (Icahn School of
2336 Medicine at Mount Sinai, New York City, NY, USA)*; Rob M van Dam (George Washington
2337 University, Washington, DC, USA)*; Bert-Jan van den Born (University of Amsterdam,
2338 Amsterdam, The Netherlands)*; Johan Van der Heyden (Sciensano, Brussels, Belgium)*;
2339 Yvonne T van der Schouw (Utrecht University, Utrecht, The Netherlands)*; Koen Van Herck
2340 (Ghent University, Ghent, Belgium)*; Wendy Van Lippevelde (Ghent University, Ghent,
2341 Belgium)*; Hoang Van Minh (Hanoi University of Public Health, Hanoi, Vietnam)*; Natasja M
2342 Van Schoor (VU University Medical Center, Amsterdam, The Netherlands)*; Irene GM van
2343 Valkengoed (University of Amsterdam, Amsterdam, The Netherlands)*; Dirk Vanderschueren

2344 (KU Leuven, Leuven, Belgium)*; Diego Vanuzzo (Cardiovascular Prevention Centre Udine,
2345 Udine, Italy)*; Anette Varbo (Copenhagen University Hospital, Copenhagen, Denmark;
2346 University of Copenhagen, Copenhagen, Denmark)*; Gregorio Varela-Moreiras (Universidad
2347 CEU San Pablo, Madrid, Spain)*; Luz Mayibe Vargas (Pontificia Universidad Javeriana, Bogotá,
2348 Colombia)*; Patricia Varona-Pérez (National Institute of Hygiene, Epidemiology and
2349 Microbiology, Havana, Cuba)*; Senthil K Vasan (University of Southampton, Southampton,
2350 UK)*; Daniel G Vasques (Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil)*;
2351 Tomas Vega (Consejería de Sanidad Junta de Castilla y León, Valladolid, Spain)*; Toomas
2352 Veidebaum (National Institute for Health Development, Tallinn, Estonia)*; Gustavo Velasquez-
2353 Melendez (Universidade Federal de Minas Gerais, Belo Horizonte, Brazil)*; Biruta Velika
2354 (Centre for Disease Prevention and Control, Riga, Latvia)*; Maïté Verloigne (Ghent University,
2355 Ghent, Belgium)*; Giovanni Veronesi (University of Insubria, Varese, Italy)*; WM Monique
2356 Verschuren (National Institute for Public Health and the Environment, Bilthoven, The
2357 Netherlands)*; Cesar G Victora (Federal University of Pelotas, Pelotas, Brazil)*; Giovanni Viegi
2358 (National Research Council, Pisa, Italy)*; Lucie Viet (National Institute for Public Health and the
2359 Environment, Bilthoven, The Netherlands)*; Frøydis N Vik (University of Agder, Kristiansand,
2360 Norway)*; Monica Vilar (Universidad San Francisco de Quito, Quito, Ecuador)*; Salvador
2361 Villalpando (National Institute of Public Health, Cuernavaca, Mexico)*; Jesus Vioque (University
2362 Miguel Hernandez, Alicante, Spain)*; Jyrki K Virtanen (University of Eastern Finland, Kuopio,
2363 Finland)*; Marjolein Visser (Vrije Universiteit Amsterdam, Amsterdam, The Netherlands)*;
2364 Sophie Visvikis-Siest (Université de Lorraine, Nancy, France)*; Bharathi Viswanathan (Ministry
2365 of Health, Victoria, Seychelles)*; Mihaela Vladulescu (Sunflower Nursery School, Craiova,
2366 Romania)*; Tiina Vlasoff (North Karelia Center for Public Health, Joensuu, Finland)*; Dorja
2367 Vocanec (University of Zagreb, Zagreb, Croatia)*; Peter Vollenweider (Lausanne University
2368 Hospital, Lausanne, Switzerland; University of Lausanne, Lausanne, Switzerland)*; Henry
2369 Völzke (University Medicine Greifswald, Greifswald, Germany)*; Ari Voutilainen (University of

2370 Eastern Finland, Kuopio, Finland)*; Martine Vrijheid (Barcelona Institute for Global Health
2371 CIBERESP, Barcelona, Spain)*; Tanja GM Vrijkotte (University Medical Centers, Amsterdam,
2372 The Netherlands; University of Amsterdam, Amsterdam, The Netherlands)*; Alisha N Wade
2373 (University of the Witwatersrand, Johannesburg, South Africa)*; Thomas Waldhör (Medical
2374 University of Vienna, Vienna, Austria)*; Janette Walton (Munster Technological University, Cork,
2375 Ireland)*; Elvis OA Wambiya (African Population and Health Research Center, Nairobi, Kenya)*;
2376 Wan Mohamad Wan Bebakar (Universiti Sains Malaysia, Kelantan, Malaysia)*; Wan Nazaimoon
2377 Wan Mohamud (Institute for Medical Research, Kuala Lumpur, Malaysia)*; Rildo de Souza
2378 Wanderley Júnior (University of Pernambuco, Recife, Brazil)*; Ming-Dong Wang (Public Health
2379 Agency of Canada, Ottawa, Ontario, Canada)*; Ningli Wang (Capital Medical University Beijing
2380 Tongren Hospital, Beijing, China)*; Qian Wang (Xinjiang Medical University, Urumqi, China)*;
2381 Xiangjun Wang (Shanghai Educational Development Co. Ltd, Shanghai, China)*; Ya Xing Wang
2382 (Capital Medical University, Beijing, China)*; Ying-Wei Wang (Ministry of Health and Welfare,
2383 Taipei, Taiwan)*; S Goya Wannamethee (University College London, London, UK)*; Nicholas
2384 Wareham (University of Cambridge, Cambridge, UK)*; Adelheid Weber (Federal Ministry of
2385 Social Affairs, Health, Care and Consumer Protection, Vienna, Austria)*; Karen Webster-Kerr
2386 (Ministry of Health and Wellness, Kingston, Jamaica)*; Niels Wedderkopp (University of
2387 Southern Denmark, Odense, Denmark)*; Daniel Weghuber (Paracelsus Medical University,
2388 Salzburg, Austria)*; Wenbin Wei (Capital Medical University, Beijing, China)*; Aneta Weres
2389 (University of Rzeszów, Rzeszów, Poland)*; Bo Werner (Örebro University, Örebro, Sweden)*;
2390 Leo D Westbury (University of Southampton, Southampton, UK)*; Peter H Whincup (St
2391 George's, University of London, London, UK)*; Kremlin Wickramasinghe (World Health
2392 Organization Regional Office for Europe, Moscow, Russia)*; Kurt Widhalm (Medical University
2393 of Vienna, Vienna, Austria)*; Indah S Widyahening (Universitas Indonesia, Jakarta, Indonesia)*;
2394 Andrzej Więcek (Medical University of Silesia, Katowice, Poland)*; Philipp S Wild (Johannes
2395 Gutenberg University, Mainz, Germany)*; Rainford J Wilks (The University of the West Indies,

2396 Kingston, Jamaica)*; Johann Willeit (Medical University of Innsbruck, Innsbruck, Austria)*; Peter
2397 Willeit (Medical University of Innsbruck, Innsbruck, Austria)*; Julianne Williams (World Health
2398 Organization Regional Office for Europe, Moscow, Russia)*; Tom Wilsgaard (UiT The Arctic
2399 University of Norway, Tromsø, Norway)*; Rusek Wojciech (Rehamed-Center, Tajęcina,
2400 Poland)*; Bogdan Wojtyniak (National Institute of Public Health - National Institute of Hygiene,
2401 Warsaw, Poland)*; Roy A Wong-McClure (Caja Costarricense de Seguro Social, San José,
2402 Costa Rica)*; Andrew Wong (University College London, London, UK)*; Emily B Wong (Africa
2403 Health Research Institute, Durban, South Africa)*; Jyh Eiin Wong (Universiti Kebangsaan
2404 Malaysia, Kuala Lumpur, Malaysia)*; Tien Yin Wong (Duke-NUS Medical School, Singapore,
2405 Singapore)*; Jean Woo (The Chinese University of Hong Kong, Hong Kong, China)*; Mark
2406 Woodward (University of New South Wales, Sydney, New South Wales, Australia; Imperial
2407 College London, London, UK)*; Frederick C Wu (University of Manchester, Manchester, UK)*;
2408 Hon-Yen Wu (National Yang Ming Chiao Tung University, Taipei, Taiwan)*; Jianfeng Wu
2409 (Shandong University of Traditional Chinese Medicine, Shandong, China)*; Li Juan Wu (Capital
2410 Medical University, Beijing, China)*; Shouling Wu (Kailuan General Hospital, Tangshan,
2411 China)*; Justyna Wszyńska (University of Rzeszów, Rzeszów, Poland)*; Haiquan Xu (Institute
2412 of Food and Nutrition Development of Ministry of Agriculture and Rural Affairs, Beijing, China)*;
2413 Liang Xu (Beijing Institute of Ophthalmology, Beijing, China)*; Nor Azwany Yaacob (Universiti
2414 Sains Malaysia, Kelantan, Malaysia)*; Uruwan Yamborisut (Mahidol University, Nakhon
2415 Pathom, Thailand)*; Weili Yan (Children's Hospital of Fudan University, Shanghai, China)*; Ling
2416 Yang (University of Oxford, Oxford, UK)*; Xiaoguang Yang (Chinese Center for Disease Control
2417 and Prevention, Beijing, China)*; Yang Yang (Shanghai Educational Development Co. Ltd,
2418 Shanghai, China)*; Nazan Yardim (Ministry of Health, Ankara, Turkey)*; Tabara Yasuharu
2419 (Kyoto University, Kyoto, Japan)*; Martha Yépez García (Universidad San Francisco de Quito,
2420 Quito, Ecuador)*; Panayiotis K Yiallourous (University of Cyprus, Nicosia, Cyprus)*; Agneta
2421 Yngve (Uppsala University, Uppsala, Sweden)*; Moein Yoosefi (Non-Communicable Diseases

2422 Research Center, Tehran, Iran)*; Akihiro Yoshihara (Niigata University, Niigata, Japan)*; Qi
2423 Sheng You (Capital Medical University, Beijing, China)*; San-Lin You (Fu Jen Catholic
2424 University, Taipei, Taiwan)*; Novie O Younger-Coleman (The University of the West Indies,
2425 Kingston, Jamaica)*; Yu-Ling Yu (KU Leuven, Leuven, Belgium)*; Yunjiang Yu (South China
2426 Institute of Environmental Sciences, Guangzhou, China)*; Safiah Md Yusof (International
2427 Medical University, Shah Alam, Malaysia)*; Ahmad Faudzi Yusoff (Ministry of Health, Kuala
2428 Lumpur, Malaysia)*; Luciana Zaccagni (University of Ferrara, Ferrara, Italy)*; Vassilis
2429 Zafiropulos (Hellenic Mediterranean University, Heraklion, Greece)*; Ahmad A Zainuddin
2430 (Ministry of Health, Kuala Lumpur, Malaysia)*; Seyed Rasoul Zakavi (Mashhad University of
2431 Medical Sciences, Mashhad, Iran)*; Farhad Zamani (Iran University of Medical Sciences,
2432 Tehran, Iran)*; Sabina Zambon (University of Padua, Padua, Italy)*; Antonis Zampelas
2433 (Agricultural University of Athens, Athens, Greece)*; Hana Zamrazilová (Institute of
2434 Endocrinology, Prague, Czech Republic)*; Maria Elisa Zapata (Centro de Estudios sobre
2435 Nutrición Infantil, Buenos Aires, Argentina)*; Abdul Hamid Zargar (Center for Diabetes and
2436 Endocrine Care, Srinagar, India)*; Ko Ko Zaw (University of Public Health, Yangon, Myanmar)*;
2437 Ayman A Zayed (University of Jordan, Amman, Jordan)*; Tomasz Zdrojewski (Medical
2438 University of Gdansk, Gdansk, Poland)*; Magdalena Żegleń (Jagiellonian University, Kraków,
2439 Poland)*; Kristyna Zejglicova (National Institute of Public Health, Prague, Czech Republic)*;
2440 Tajana Zeljkovic Vrkic (University Hospital Center Zagreb, Zagreb, Croatia)*; Yi Zeng (Peking
2441 University, Beijing, China; Duke University, Durham, NC, USA)*; Luxia Zhang (Peking University
2442 First Hospital, Beijing, China)*; Zhen-Yu Zhang (KU Leuven, Leuven, Belgium)*; Dong Zhao
2443 (Capital Medical University Beijing An Zhen Hospital, Beijing, China)*; Ming-Hui Zhao (Peking
2444 University First Hospital, Beijing, China)*; Wenhua Zhao (Chinese Center for Disease Control
2445 and Prevention, Beijing, China)*; Yanitsa V Zhecheva (Bulgarian Academy of Sciences, Sofia,
2446 Bulgaria)*; Shiqi Zhen (Jiangsu Provincial Center for Disease Control and Prevention, Nanjing,
2447 China)*; Wei Zheng (Vanderbilt University, Nashville, TN, USA)*; Yingfeng Zheng (Sun Yat-sen

2448 University, Guangzhou, China)*; Bekbolat Zholdin (West Kazakhstan Medical University,
2449 Aktobe, Kazakhstan)*; Maigeng Zhou (Chinese Center for Disease Control and Prevention,
2450 Beijing, China)*; Dan Zhu (Inner Mongolia Medical University, Hohhot, China)*; Marie Zins
2451 (Institut National de la Santé et de la Recherche Médicale, Paris, France; Paris University,
2452 Paris, France)*; Emanuel Zitt (Agency for Preventive and Social Medicine, Bregenz, Austria)*;
2453 Yanina Zocalo (Universidad de la República, Montevideo, Uruguay)*; Nada Zoghlami (National
2454 Institute of Public Health, Tunis, Tunisia)*; Julio Zuñiga Cisneros (Instituto Conmemorativo
2455 Gorgas de Estudios de la Salud, Panama City, Panama)*; Monika Zuziak (Przedszkole No. 81,
2456 Warsaw, Poland)*
2457

2458 **Fig. 1. Change in the urban-rural height and body-mass index (BMI) difference from 1990**
2459 **to 2020.**

2460

2461 (A) Change in urban-rural difference in age-standardised mean height in relation to change in
2462 age-standardised mean rural height. (B) Change in urban-rural difference in age-standardised
2463 mean BMI in relation to change in age-standardised mean rural BMI. (C) Change in urban-rural
2464 difference in age-standardised mean height and urban-rural difference in age-standardised
2465 mean BMI.

2466

2467 Each solid arrow in lighter shade shows one country, beginning in 1990 and ending in 2020.
2468 The dashed arrows in darker shade show the regional averages, calculated as the unweighted
2469 arithmetic mean of the values for all countries in each region along the horizontal and vertical
2470 axes. For urban-rural difference, a positive number shows higher urban mean height and BMI
2471 and a negative number shows higher rural mean height and BMI.

2472

2473 See Extended Data Fig. 2 and Extended Data Fig. 3 for urban-rural differences in age-
2474 standardised mean height and BMI, and their change over time shown as maps, together with
2475 uncertainties in the estimates. See Extended Data Fig. 4 for results at ages 5, 10, 15 and 19
2476 years.

2477

2478 We did not estimate the difference between rural and urban height for areas classified as
2479 entirely urban (Bermuda, Kuwait, Nauru and Singapore) or entirely rural (Tokelau).

2480 **Fig. 2. Urban and rural height in 2020 and change from 1990 to 2020.**

2481

2482 The maps show age-standardised mean height in 2020 and change from 1990 to 2020, by
2483 urban and rural place of residence for girls and boys. The density plot below each map shows
2484 the distribution of estimates across countries. The top right graph in each panel shows the age-
2485 standardised mean height in 2020 for all countries, together with their 95% credible intervals.
2486 Countries are ordered by region and super-region. The bottom right graph in each panel shows
2487 the change from 1990 to 2020 in mean height in relation to the uncertainty of the change
2488 measured by posterior standard deviation. Each point shows one country. Shaded areas show
2489 the posterior probability (PP) of an estimated change being a true increase or decrease. The PP
2490 of a decrease is one minus that of an increase. If an increase in mean height is
2491 statistically indistinguishable from a decrease, the PP of an increase and a decrease is 0.50.
2492 PPs closer to 0.50 indicate more uncertainty, those towards 1 indicate more certainty of change.

2493

2494 See Extended Data Fig. 5 for a map of PPs of the estimated change. See Supplementary
2495 Figure 3 for results at ages 5, 10, 15 and 19 years. See Supplementary Table 3 for numerical
2496 results, including credible intervals, as age-standardised and at ages 5, 10, 15 and 19 years.

2497

2498 We did not estimate mean rural height in areas classified as entirely urban (Bermuda, Kuwait,
2499 Nauru and Singapore), mean urban height in areas classified as entirely rural (Tokelau), or their
2500 change over time in these areas, as indicated by grey colour.

2501 **Fig. 3. Urban and rural body-mass index (BMI) in 2020 and change from 1990 to 2020.**

2502

2503 The maps show age-standardised mean BMI in 2020 and change from 1990 to 2020, by urban
2504 and rural place of residence for girls and boys. See Fig. 2 caption for descriptions of other
2505 sections of the figure and for definitions.

2506

2507 See Extended Data Fig. 6 for a map of posterior probabilities of the estimated change. See
2508 Supplementary Figure 4 for results at ages 5, 10, 15 and 19 years. See Supplementary Table 4
2509 for numerical results, including credible intervals, as age-standardised and at ages 5, 10, 15 and
2510 19 years.

2511

2512 We did not estimate mean rural BMI in areas classified as entirely urban (Singapore, Bermuda
2513 and Nauru), mean urban BMI in areas classified as entirely rural (Tokelau), or their change over
2514 time, as indicated by grey colour.

2515 **Extended Data Fig. 1. Number of data sources used in the analysis, by country.**

2516 **Extended Data Fig. 2. Urban-rural height difference in 2020 and change from 1990 to**
2517 **2020.**

2518
2519 The top map in each panel shows the urban-rural difference in age-standardised mean height in
2520 2020 for girls and boys. A positive number shows higher urban mean height and a negative
2521 number shows higher rural mean height. The bottom map in each panel shows the change from
2522 1990 to 2020. The density plot below each map shows the distribution of estimates across
2523 countries. The top right graph in each panel shows the urban-rural difference in age-
2524 standardised mean height in relation to the uncertainty of the change measured by posterior
2525 standard deviation. The bottom right graph in each panel shows the change from 1990 to 2020
2526 in urban-rural difference in mean height in relation to the uncertainty of the change measured by
2527 posterior standard deviation. Each point shows one country. Shaded areas show the posterior
2528 probability (PP) of a true difference (top right panel) and of a true increase or decrease in
2529 difference (bottom right panel).

2530
2531 See Extended Data Fig. 9 for PPs of the urban-rural difference in age-standardised mean height
2532 and its change. See Supplementary Figure 5 for results at ages 5, 10, 15 and 19 years.

2533
2534 We did not estimate the difference between rural and urban height for areas classified as
2535 entirely urban (Bermuda, Kuwait, Nauru and Singapore) or entirely rural (Tokelau), as indicated
2536 by grey colour.

2537 **Extended Data Fig. 3. Urban-rural body-mass index (BMI) difference in 2020 and change**
2538 **from 1990 to 2020.**

2539

2540 The maps show the urban-rural difference in age-standardised mean BMI in 2020, and its
2541 change from 1990 to 2020 for girls and boys. A positive number shows higher urban mean BMI
2542 and a negative number show higher rural mean BMI. See Extended Data Fig. 2 caption for
2543 descriptions of other sections of the figure.

2544

2545 See Extended Data Fig. 10 for posterior probabilities of the urban-rural difference in age-
2546 standardised mean BMI and its change. See Supplementary Figure 6 for results at ages 5, 10,
2547 15 and 19 years.

2548

2549 We did not estimate the difference between rural and urban BMI for areas classified as entirely
2550 urban (Bermuda, Kuwait, Nauru and Singapore) or entirely rural (Tokelau), as indicated by grey
2551 colour.

2552 **Extended Data Fig. 4. Change in the urban-rural height and body-mass index (BMI)**
2553 **difference from 1990 to 2020, by age.**

2554

2555 (A) Change in urban-rural difference in mean height in relation to change in mean rural height at
2556 ages 5, 10, 15 and 19 years. (B) Change in urban-rural difference in mean BMI in relation to
2557 change in mean BMI in at ages 5, 10, 15 and 19 years. (C) Change in urban-rural difference in
2558 mean height and urban-rural difference in mean BMI at ages 5, 10, 15 and 19 years.

2559

2560 Each solid arrow in lighter shading shows one country, beginning in 1990 and ending in 2020.
2561 The dashed arrows in darker shade show the regional averages, calculated as the unweighted
2562 arithmetic mean of the values for all countries in each region along the horizontal and vertical
2563 axes. For urban-rural difference, a positive number shows higher urban mean height and BMI
2564 and a negative number shows higher rural mean height and BMI. The dark vertical dashed lines
2565 indicate the median of the WHO reference population. For BMI, the lighter vertical dashed lines
2566 are placed one standard deviation below and above the median of the WHO reference
2567 population.

2568

2569 We did not estimate the difference between rural and urban height for areas classified as
2570 entirely urban (Bermuda, Kuwait, Nauru and Singapore) or entirely rural (Tokelau).

2571

2572 **Extended Data Fig. 5. Posterior probability of increase in mean height in urban and rural**
2573 **areas from 1990 to 2020.**

2574

2575 The maps show the posterior probability (PP) that the age-standardised mean height increased
2576 from 1990 to 2020. The PP of a decrease is one minus that of an increase. If an increase in
2577 mean height is statistically indistinguishable from a decrease, the PP is 0.50. PPs closer to 0.50
2578 indicate more uncertainty, those towards 1 indicate more certainty of an increase, and those
2579 towards 0 indicate more certainty of a decrease.

2580

2581

2582 We did not estimate PP for change in mean height in rural areas in countries classified as
2583 entirely urban (Bermuda, Kuwait, Nauru and Singapore) or change in mean height in urban
2584 areas in countries classified as entirely rural (Tokelau).

2585 **Extended Data Fig. 6. Posterior probability of increase in mean body-mass index (BMI) in**
2586 **urban and rural areas from 1990 to 2020.**

2587

2588 The maps show the posterior probability (PP) that the age-standardised mean BMI increased
2589 from 1990 to 2020. The PP of a decrease is one minus that of an increase.

2590

2591 We did not estimate PP for change in mean rural BMI in areas classified as entirely urban
2592 (Bermuda, Kuwait, Nauru and Singapore) or change in mean urban BMI in areas classified as
2593 entirely rural (Tokelau).

2594 **Extended Data Fig. 7. Comparison of urban-rural difference in height and body-mass**
2595 **index (BMI) by sex in 2020.**

2596

2597 We did not estimate the difference between rural and urban BMI or height for areas classified as
2598 entirely urban (Bermuda, Kuwait, Nauru and Singapore) or entirely rural (Tokelau).

2599 **Extended Data Fig. 8. Trends in body-mass index (BMI) by place of residence for**
2600 **children, adolescents and young adults.**

2601

2602 The figure shows trends in mean BMI at ages five and 19 years, and in age-standardised mean
2603 BMI for young adults (20-29 years and 30-39 years). Shaded areas show the 95% credible
2604 intervals. Trend for young adults were estimated using a model similar to the one described in
2605 Methods, where BMI-age patterns were allowed to vary flexibly via a cubic spline function
2606 without knots.

2607 **Extended Data Fig. 9. Posterior probability of urban-rural height difference and its**
2608 **increase from 1990 to 2020.**

2609

2610 The maps show the posterior probability (PP) that age-standardised mean height in 2020 in
2611 urban areas was higher than in rural areas (left-hand panels), and the PP that the urban-rural
2612 difference in age-standardised mean height increased from 1990 to 2020 (right-hand panels).
2613 For 2020, if estimated age-standardised mean urban height is statistically indistinguishable from
2614 rural height, the PP is 0.50. PPs closer to 0.50 indicate more uncertainty, those towards 1
2615 indicate more certainty of urban children being taller, and those towards 0 indicate more
2616 certainty of rural being taller.

2617

2618 We did not estimate the PP for differences between rural and urban height for areas classified
2619 as entirely urban (Bermuda, Kuwait, Nauru and Singapore) or entirely rural (Tokelau), as
2620 indicated by grey colour.

2621 **Extended Data Fig. 10. Posterior probability of urban-rural body-mass index (BMI)**
2622 **difference and its increase from 1990 to 2020.**

2623

2624 The maps show the posterior probability (PP) that age-standardised mean BMI in 2020 in urban
2625 areas was higher than in rural areas (left-hand panels), and the PP that the urban-rural
2626 difference in mean BMI increased from 1990 to 2020 (right-hand panels).