

Appendix table 1. The value of a statistical life with population-weighted means by World Health Organization region and World Bank income group.

	Value of a Statistical Life (VSL)
WHO Region	
Africa	204,998
Americas	1,131,663
Eastern Mediterranean	548,558
Europe	1,579,237
Southeast Asia	359,335
Western Pacific	991,653
World Bank income group	
Low income	41,756
Lower middle income	324,325
Upper middle income	1,223,582

Appendix table 2a. Results of multivariable regression between mortality rates and determinants of population health, using multiple imputation for missing data. The results of this regression was used as inputs to the model.

	MMR			U5MR		
	B	CI	p	B	CI	p
Intercept	7.640	5.26 – 10.02	<0.001	6.810	5.06 – 8.56	<0.001
GNI per capita, PPP	-0.300	-0.52 – 0.08	0.008	-0.279	-0.44 – 0.12	<0.001
Female adult literacy rate	-0.271	-0.67 – 0.13	0.178	-0.359	-0.66 – 0.06	0.020
Income poverty (% of population living on less than \$1.90 a day)	0.272	0.20 – 0.35	<0.001	0.205	0.15 – 0.26	<0.001
Physician density	-0.312	-0.46 – 0.16	<0.001	-0.113	-0.22 – 0.01	0.036
Nurse density	-0.011	-0.15 – 0.13	0.880	0.030	-0.07 – 0.13	0.568
Observations	211			211		
R ² / adj. R ²	0.854 / 0.850			0.824 / 0.819		

Appendix table 2b. Results of multivariable regression between mortality rates and determinants of population health, using list-wise deletion for missing data. Presented for comparison.

	MMR			U5MR		
	B	CI	p	B	CI	p
Intercept	6.40	4.10 – 8.69	<.001	6.64	4.89 – 8.40	<.001
GNI per capita, PPP	-0.10	-0.31 – 0.12	.366	-0.17	-0.33 – 0.01	.040
Female adult literacy rate	-0.37	-0.75 – 0.01	.057	-0.52	-0.82 – 0.23	<.001
Income poverty (% of population living on less than \$1.90 a day)	0.27	0.20 – 0.35	<.001	0.19	0.13 – 0.25	<.001

Physician density	-	-0.46 – -0.19	<.001	-0.14	-0.24 – -	.012
	0.33				0.03	
Nurse density	-	-0.15 – -0.12	.826	0.10	0.00 – 0.21	.045
	0.01					
Observations		103			104	
R ² / adj. R ²		.839 / .831			.792 / .781	

*GNI = Gross National Income, PPP = Purchasing power parity, MMR = maternal mortality ratio, U5MR = Under 5 mortality ratio

Appendix table 3. Average lives saved per physician per year as predicted by the model, by World Health Organization region and World Bank income group.

	Maternal deaths avoidable per physician	Under 5 deaths avoidable per physician
World Health Organization region		
Africa	0.272 (0.113 - 0.619)	1.449 (0.185 - 3.698)
Americas	0.005 (0.002 - 0.012)	0.045 (0.006 - 0.112)
Eastern Mediterranean	0.016 (0.006 - 0.038)	0.206 (0.027 - 0.517)
Europe	0 (0 - 0.001)	0.005 (0.001 - 0.014)
Southeast Asia	0.016 (0.008 - 0.035)	0.152 (0.019 - 0.376)
Western Pacific	0.006 (0.002 - 0.014)	0.054 (0.007 - 0.139)
World Bank income group		
Low income	0.722 (0.298 - 1.62)	3.877 (0.497 - 9.848)
Lower middle income	0.035 (0.015 - 0.081)	0.261 (0.034 - 0.656)
Upper middle income	0.003 (0.001 - 0.007)	0.037 (0.005 - 0.097)

Appendix table 4. The total annual cost of physician emigration, by country.

	Total annual cost (million USD)	% of Gross National Income
Africa	6,425 (1,572 - 15,414)	0.370% (0.0906% - 0.888%)
Algeria	272 (63 - 625)	0.141% (0.033% - 0.325%)
Angola	276 (48 - 776)	0.264% (0.046% - 0.742%)
Benin	44 (9 - 105)	0.484% (0.102% - 1.147%)
Botswana	0 (0 - 0)	0% (0% - 0%)
Burkina Faso	17 (4 - 43)	0.144% (0.032% - 0.369%)
Burundi	16 (4 - 40)	0.562% (0.153% - 1.405%)
Cabo Verde	0 (0 - 0)	0% (0% - 0%)
Cameroon	186 (46 - 496)	0.607% (0.148% - 1.613%)
Central African Republic	2 (1 - 5)	0.125% (0.031% - 0.326%)
Chad	0 (0 - 0)	0% (0% - 0%)
Comoros	0 (0 - 0)	0% (0% - 0%)
Congo	168 (49 - 376)	1.434% (0.419% - 3.211%)
Congo, the Democratic Republic of the	12 (3 - 31)	0.038% (0.01% - 0.097%)
Cote d'Ivoire	34 (9 - 81)	0.105% (0.027% - 0.253%)
Equatorial Guinea	0 (0 - 0)	0% (0% - 0%)
Eritrea	0 (0 - 0)	0% (0% - 0%)
Ethiopia	302 (74 - 710)	0.513% (0.125% - 1.206%)
Gabon	71 (16 - 174)	0.445% (0.098% - 1.093%)
Gambia	0 (0 - 0)	0% (0% - 0%)
Ghana	415 (95 - 934)	1.025% (0.235% - 2.308%)
Guinea	15 (4 - 36)	0.253% (0.068% - 0.606%)
Guinea-Bissau	0 (0 - 0)	0% (0% - 0%)
Kenya	42 (13 - 100)	0.068% (0.02% - 0.161%)
Lesotho	0 (0 - 0)	0% (0% - 0%)
Liberia	15 (5 - 31)	0.894% (0.271% - 1.796%)
Madagascar	15 (4 - 39)	0.152% (0.037% - 0.384%)
Malawi	14 (4 - 34)	0.246% (0.072% - 0.577%)
Mali	23 (5 - 66)	0.176% (0.039% - 0.496%)
Mauritania	0 (0 - 1)	0.009% (0.002% - 0.026%)
Mauritius	1 (0 - 3)	0.005% (0.001% - 0.028%)

Mozambique	6 (1 - 14)	0.035% (0.009% - 0.086%)
Namibia	0 (0 - 0)	0% (0% - 0%)
Niger	12 (3 - 28)	0.147% (0.035% - 0.361%)
Nigeria	3,128 (830 - 7,457)	0.616% (0.164% - 1.468%)
Rwanda	2 (1 - 6)	0.03% (0.008% - 0.074%)
Sao Tome and Principe	0 (0 - 0)	0% (0% - 0%)
Senegal	74 (18 - 170)	0.495% (0.123% - 1.145%)
Sierra Leone	35 (11 - 79)	0.885% (0.284% - 1.958%)
South Africa	955 (187 - 2,308)	0.286% (0.056% - 0.691%)
Swaziland	1 (0 - 2)	0.02% (0.005% - 0.048%)
Tanzania, United Republic of	71 (19 - 174)	0.149% (0.04% - 0.366%)
Togo	22 (5 - 50)	0.561% (0.122% - 1.269%)
Uganda	50 (12 - 122)	0.183% (0.045% - 0.446%)
Zambia	39 (8 - 98)	0.162% (0.033% - 0.405%)
Zimbabwe	89 (22 - 198)	0.658% (0.165% - 1.471%)
Americas	1,079 (216 - 2,631)	0.020% (0.0041% - 0.050%)
Argentina	40 (8 - 98)	0.007% (0.002% - 0.018%)
Belize	2 (0 - 13)	0.138% (0.012% - 0.817%)
Bolivia, Plurinational State of	54 (13 - 125)	0.167% (0.041% - 0.388%)
Brazil	45 (8 - 111)	0.002% (0% - 0.005%)
Colombia	84 (18 - 223)	0.024% (0.005% - 0.065%)
Costa Rica	11 (2 - 29)	0.022% (0.004% - 0.057%)
Cuba	6 (1 - 16)	0.008% (0.002% - 0.021%)
Dominican Republic	296 (56 - 680)	0.451% (0.085% - 1.035%)
Ecuador	64 (11 - 171)	0.066% (0.011% - 0.176%)
El Salvador	3 (1 - 8)	0.012% (0.002% - 0.031%)
Guatemala	24 (5 - 70)	0.042% (0.008% - 0.119%)
Guyana	8 (2 - 21)	0.258% (0.049% - 0.681%)
Haiti	36 (8 - 81)	0.411% (0.097% - 0.933%)
Honduras	5 (1 - 13)	0.029% (0.007% - 0.069%)
Jamaica	29 (6 - 70)	0.213% (0.042% - 0.508%)
Mexico	240 (44 - 572)	0.019% (0.004% - 0.046%)
Nicaragua	4 (1 - 10)	0.036% (0.008% - 0.088%)
Panama	13 (3 - 34)	0.029% (0.007% - 0.072%)
Paraguay	6 (1 - 15)	0.02% (0.005% - 0.053%)

Peru	57 (12 - 141)	0.03% (0.006% - 0.073%)
Saint Vincent and the Grenadines	0 (0 - 0)	0% (0% - 0%)
Suriname	0 (0 - 2)	0.006% (0.002% - 0.03%)
Venezuela, Bolivarian Republic of	50 (13 - 129)	0.014% (0.004% - 0.036%)
Eastern Mediterranean	3,468 (610 - 8,490)	0.205% (0.0361% - 0.503%)
Afghanistan	27 (6 - 68)	0.135% (0.029% - 0.342%)
Egypt	196 (31 - 505)	0.064% (0.01% - 0.165%)
Iran, Islamic Republic of	309 (49 - 780)	0.06% (0.01% - 0.152%)
Iraq	847 (137 - 2,053)	0.4% (0.065% - 0.969%)
Jordan	46 (9 - 113)	0.13% (0.024% - 0.318%)
Lebanon	18 (2 - 50)	0.04% (0.005% - 0.112%)
Libya	20 (3 - 51)	0.07% (0.01% - 0.173%)
Morocco	57 (12 - 144)	0.054% (0.011% - 0.136%)
Pakistan	1,608 (283 - 3,906)	0.592% (0.104% - 1.438%)
Sudan	295 (66 - 707)	0.381% (0.085% - 0.915%)
Tunisia	16 (3 - 42)	0.037% (0.007% - 0.094%)
Yemen	30 (9 - 72)	0.098% (0.029% - 0.234%)
Europe	434 (75 - 1,070)	0.013% (0.0022% - 0.031%)
Albania	6 (1 - 16)	0.046% (0.005% - 0.133%)
Armenia	1 (0 - 2)	0.006% (0.001% - 0.019%)
Azerbaijan	10 (1 - 30)	0.016% (0.002% - 0.048%)
Belarus	2 (0 - 4)	0.003% (0% - 0.007%)
Bosnia and Herzegovina	1 (0 - 3)	0.003% (0% - 0.019%)
Bulgaria	17 (2 - 42)	0.031% (0.004% - 0.079%)
Georgia	1 (0 - 3)	0.007% (0.001% - 0.019%)
Kazakhstan	5 (1 - 13)	0.003% (0% - 0.006%)
Kyrgyzstan	0 (0 - 1)	0.004% (0.001% - 0.01%)
Macedonia, the former Yugoslav Republic of	2 (0 - 12)	0.02% (0.001% - 0.116%)
Moldova, Republic of	1 (0 - 2)	0.008% (0.001% - 0.022%)
Montenegro	0 (0 - 1)	0.003% (0% - 0.021%)
Romania	120 (23 - 275)	0.063% (0.012% - 0.146%)
Russian Federation	183 (32 - 448)	0.011% (0.002% - 0.026%)
Serbia	7 (1 - 17)	0.017% (0.003% - 0.043%)

Tajikistan	1 (0 - 2)	0.007% (0.001% - 0.02%)
Turkey	73 (12 - 180)	0.009% (0.001% - 0.023%)
Turkmenistan	1 (0 - 2)	0.001% (0% - 0.004%)
Ukraine	4 (1 - 10)	0.004% (0.001% - 0.009%)
Uzbekistan	2 (0 - 6)	0.003% (0% - 0.009%)
Southeast Asia	3,804 (780 - 9,042)	0.102% (0.0209% - 0.243%)
Bangladesh	82 (18 - 196)	0.043% (0.009% - 0.103%)
Bhutan	0 (0 - 0)	0% (0% - 0%)
India	3,427 (701 - 8,126)	0.164% (0.034% - 0.389%)
Indonesia	90 (20 - 218)	0.01% (0.002% - 0.025%)
Maldives	0 (0 - 0)	0.002% (0% - 0.013%)
Myanmar	61 (13 - 153)	0.098% (0.02% - 0.245%)
Nepal	36 (9 - 82)	0.171% (0.045% - 0.392%)
Sri Lanka	63 (12 - 144)	0.079% (0.015% - 0.18%)
Thailand	45 (7 - 123)	0.012% (0.002% - 0.032%)
Timor-Leste	0 (0 - 0)	0% (0% - 0%)
Western Pacific	645 (132 - 1,598)	0.005% (0.0011% - 0.014%)
Cambodia	4 (1 - 9)	0.021% (0.005% - 0.055%)
China	84 (15 - 210)	0.001% (0% - 0.002%)
Fiji	1 (0 - 5)	0.022% (0.003% - 0.126%)
Kiribati	0 (0 - 0)	0% (0% - 0%)
Lao People's Democratic Republic	2 (0 - 5)	0.015% (0.003% - 0.039%)
Malaysia	16 (4 - 39)	0.005% (0.001% - 0.012%)
Micronesia, Federated States of	0 (0 - 0)	0% (0% - 0%)
Mongolia	1 (0 - 3)	0.009% (0.002% - 0.023%)
Papua New Guinea	3 (1 - 9)	0.019% (0.004% - 0.053%)
Philippines	525 (110 - 1,296)	0.147% (0.031% - 0.362%)
Samoa	0 (0 - 2)	0.038% (0.003% - 0.228%)
Solomon Islands	0 (0 - 0)	0% (0% - 0%)
Tonga	0 (0 - 0)	0% (0% - 0%)
Vanuatu	0 (0 - 0)	0% (0% - 0%)
Viet Nam	9 (2 - 21)	0.005% (0.001% - 0.012%)
Total	15,855 (3,384 - 38,245)	0.057% (0.0123% - 0.138%)