

## Correction: Evaluation of the Global Health Security Index as a predictor of COVID-19 excess mortality standardised for under-reporting and age structure

Ledesma JR, Isaac CR, Dowell SF, *et al.* Evaluation of the Global Health Security Index as a predictor of COVID-19 excess mortality standardised for under-reporting and age structure. *BMJ Global Health* 2023;8:e012203. doi:10.1136/bmjgh-2023-012203

This article has been corrected since it published online to update the table 2 in the manuscript and adjusting the language of the paper in which the author discusses the significance of the indicators. We have update [table 2](#) and online supplemental appendix file.

**Table 2** Unadjusted and income-adjusted effect sizes and corresponding multiple hypothesis adjusted 95% CIs using robust standard errors of 2021 Global Health Security measures on comparative COVID-19 excess mortality ratio

Pandemic preparedness capacity	Unadjusted analysis		Income-adjusted analysis	
	Coefficient (adjusted 95% CI)	P value	Coefficient (adjusted 95% CI)	P value
Global Health Security Index Score	-0.29 (-0.46,-0.12)	<0.0001 **	-0.21 (-0.41,-0.02)	0.0004 **
Prevention score	-0.19 (-0.31,-0.06)	<0.0001 **	-0.11 (-0.26, 0.03)	0.0086 *
(1.1) Antimicrobial resistance	-0.09 (-0.17,-0.02)	<0.0001 **	-0.05 (-0.14, 0.04)	0.0670
(1.2) Zoonotic disease	-0.15 (-0.28,-0.03)	<0.0001 **	-0.09 (-0.23, 0.04)	0.0200 *
(1.3) Biosecurity	-0.11 (-0.20,-0.02)	<0.0001 **	-0.05 (-0.16, 0.06)	0.1325
(1.4) Biosafety	-0.07 (-0.14,-0.00)	0.0007 **	-0.03 (-0.11, 0.04)	0.1577
(1.5) Dual-use research and culture of responsible science	-0.12 (-0.29, 0.05)	0.0206 *	-0.04 (-0.17, 0.09)	0.3027
(1.6) Immunisation	-0.09 (-0.19, 0.00)	0.0011 *	-0.08 (-0.17, 0.01)	0.0047 *
Detection score	-0.14 (-0.26,-0.02)	<0.0001 **	-0.09 (-0.22, 0.03)	0.0140 *
(2.1) Laboratory systems strength and quality	-0.06 (-0.14, 0.02)	0.0097 *	-0.05 (-0.13, 0.03)	0.0540
(2.1.1) Lab capacity for detecting priority diseases	-0.07 (-0.15, 0.01)	0.0042 *	-0.06 (-0.14, 0.02)	0.0166 *
(2.1.2) Laboratory quality systems	-0.03 (-0.10, 0.03)	0.0963	-0.02 (-0.09, 0.05)	0.2774
(2.2) Laboratory supply chains	-0.04 (-0.14, 0.07)	0.2397	0.02 (-0.10, 0.14)	0.5140
(2.3) Real-time surveillance and reporting	-0.04 (-0.11, 0.04)	0.1163	-0.02 (-0.10, 0.05)	0.3634
(2.4) Surveillance data accessibility and transparency	-0.09 (-0.16,-0.02)	<0.0001 **	-0.04 (-0.13, 0.04)	0.1103
(2.5) Case-based investigation	-0.12 (-0.23,-0.01)	0.0005 **	-0.09 (-0.19, 0.01)	0.0042 *
(2.6) Epidemiology workforce	-0.06 (-0.16, 0.05)	0.0673	-0.07 (-0.17, 0.04)	0.0332 *
Response score	-0.27 (-0.48,-0.06)	<0.0001 **	-0.19 (-0.41, 0.04)	0.0072 *
(3.1) Emergency preparedness and response planning	-0.11 (-0.22,-0.01)	0.0005 **	-0.07 (-0.19, 0.04)	0.0270 *
(3.1.1) National public health emergency preparedness plan	-0.09 (-0.16,-0.02)	<0.0001 **	-0.05 (-0.12, 0.03)	0.0398 *
(3.1.3) Non-pharmaceutical interventions planning'	-0.06 (-0.13, 0.01)	0.0028 *	-0.04 (-0.11, 0.02)	0.0274 *
(3.2) Exercising response plans	-0.09 (-0.32, 0.14)	0.2130	-0.11 (-0.34, 0.11)	0.1003
(3.3) Emergency response operation	-0.04 (-0.17, 0.09)	0.2590	-0.06 (-0.19, 0.07)	0.1020

Pandemic preparedness capacity	Unadjusted analysis		Income-adjusted analysis	
	Coefficient (adjusted 95% CI)	P value	Coefficient (adjusted 95% CI)	P value
(3.4) Linking public health and security authorities	-0.05 (-0.10, 0.00)	0.0014 *	-0.02 (-0.07, 0.04)	0.3364
(3.5) Risk communication	-0.11 (-0.24, 0.01)	0.0027 *	-0.07 (-0.20, 0.05)	0.0523
(3.6) Access to communications infrastructure	-0.20 (-0.36,-0.05)	<0.0001 **	-0.17 (-0.33,-0.01)	0.0007 **
(3.7) Trade and travel restrictions	0.03 (-0.06, 0.11)	0.3070	0.03 (-0.05, 0.12)	0.1835
Health system score	-0.18 (-0.32,-0.03)	<0.0001 **	-0.10 (-0.27, 0.06)	0.0366 *
(4.1) Health capacity in clinics, hospitals and community care centres	-0.18 (-0.29,-0.06)	<0.0001 **	-0.10 (-0.24, 0.05)	0.0247 *
(4.1.2) Facilities capacity	-0.10 (-0.19,-0.02)	0.0001 **	-0.06 (-0.15, 0.04)	0.0436 *
(4.2) Supply chain for health system and healthcare workers	-0.10 (-0.21, 0.01)	0.0023 *	-0.06 (-0.17, 0.05)	0.0878
(4.3) Medical countermeasures and personnel deployment	-0.06 (-0.15, 0.03)	0.0245 *	-0.02 (-0.10, 0.06)	0.3205
(4.4) Healthcare access	0.02 (-0.38, 0.42)	0.8532	-0.05 (-0.42, 0.32)	0.6395
(4.5) Communications with healthcare workers during health emergency	-0.06 (-0.15, 0.03)	0.0313 *	-0.02 (-0.10, 0.05)	0.3019
(4.6) Infection control practices	-0.06 (-0.11,-0.01)	<0.0001 **	-0.03 (-0.08, 0.03)	0.0738
(4.7) Capacity to test and approve new medical countermeasures	-0.08 (-0.20, 0.03)	0.0171 *	-0.06 (-0.18, 0.06)	0.0991
International norms score	-0.21 (-0.44, 0.01)	0.0021 *	-0.17 (-0.39, 0.05)	0.0127 *
(5.1) IHR reporting compliance and disaster risk reduction	0.01 (-0.10, 0.12)	0.7009	0.01 (-0.09, 0.11)	0.8552
(5.2) Cross-border agreements on public health emergency response	-0.09 (-0.16,-0.02)	<0.0001 **	-0.07 (-0.14, 0.00)	0.0012 *
(5.3) International commitments	-0.10 (-0.18,-0.01)	0.0002 **	-0.06 (-0.16, 0.03)	0.0261 *
(5.4) JEE and PVS	0.08 (-0.05, 0.21)	0.0334 *	0.03 (-0.10, 0.16)	0.4266
(5.5) Financing	-0.04 (-0.18, 0.09)	0.2696	-0.07 (-0.19, 0.05)	0.0432 *
(5.6) Commitment to sharing of genetic & biological data & specimens	-0.14 (-0.36, 0.08)	0.0358 *	-0.05 (-0.26, 0.16)	0.4391
Risk environment score	-0.33 (-0.47,-0.19)	<0.0001 **	-0.30 (-0.50,-0.10)	<0.0001 **
(6.1) Political and security risk	-0.19 (-0.30,-0.08)	<0.0001 **	-0.15 (-0.30, 0.00)	0.0014 *
(6.1.1) Government effectiveness	-0.21 (-0.30,-0.13)	<0.0001 **	-0.21 (-0.35,-0.06)	<0.0001 **
(6.2) Socio-economic resilience	-0.26 (-0.39,-0.13)	<0.0001 **	-0.23 (-0.39,-0.07)	<0.0001 **
(6.2.3) Social inclusion	-0.17 (-0.26,-0.08)	<0.0001 **	-0.13 (-0.24,-0.02)	0.0002 **
(6.2.4) Public confidence in government	-0.10 (-0.18,-0.03)	<0.0001 **	-0.08 (-0.15,-0.00)	0.0008 **
(6.2.6) Inequality	-0.11 (-0.24, 0.02)	0.0056 *	-0.11 (-0.23, 0.01)	0.0035 *
(6.3) Infrastructure adequacy	-0.16 (-0.24,-0.08)	<0.0001 **	-0.11 (-0.23, 0.02)	0.0049 *
(6.4) Environmental risks	-0.08 (-0.33, 0.18)	0.3244	-0.04 (-0.29, 0.20)	0.5659
(6.5) Public health vulnerabilities	-0.30 (-0.45,-0.16)	<0.0001 **	-0.21 (-0.40,-0.02)	0.0003 **
(6.5.1) Access to quality healthcare	-0.23 (-0.67, 0.20)	0.0710	-0.27 (-0.68, 0.14)	0.0306 *
(6.5.4) Trust in medical and health advice	-0.06 (-0.14, 0.02)	0.0150 *	-0.01 (-0.10, 0.07)	0.5972
(6.5.4a) Trust medical and health advice from the government	-0.02 (-0.08, 0.05)	0.3892	0.01 (-0.05, 0.07)	0.5280

Pandemic preparedness capacity	Unadjusted analysis		Income-adjusted analysis	
	Coefficient (adjusted 95% CI)	P value	Coefficient (adjusted 95% CI)	P value
(6.5.4b) Trust medical and health advice from medical workers	-0.08 (-0.16, 0.01)	0.0038 *	-0.04 (-0.13, 0.06)	0.1918

Effect sizes compare a 5-score difference in each index; separate regressions were implemented for each Global Health Security Index measure to assess the effect of the measure independent of other indicators. The unadjusted analysis does not include any covariates while the adjusted analysis includes 2019 gross domestic product per capita as a covariate in each regression. The 95% confidence intervals (CIs) and p-values constructed based on robust covariance matrix estimation from model parameters. The 95% confidence intervals were also adjusted to take into account multiple hypotheses. The adjusted 95% confidence intervals are therefore analogous to 99.91% confidence intervals. The normal 95% CIs found in Table S2. Some risk environment category capacities including political and security risk, inequality, environmental risks, public health vulnerabilities are reverse coded such that higher levels indicate lower risks.

\*Significant at the traditional 0.05 level.

\*\*Significant after taking into account the correction for multiple hypotheses at the strict 0.0009 level.

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