

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Holmer H, Lantz A, Kunjumen T, et al. Global distribution of surgeons, anaesthesiologists, and obstetricians. *Lancet Glob Health* 2015; **3**: S9–11.

APPENDIX

Definitions

All actively practicing, licenced, qualified surgeons, anaesthesiologists and obstetricians were included. Licenced providers were defined according to the local medical licensing authorities. Residents or trainees were excluded, to reflect only fully trained personnel, when this was possible, as were visiting specialists on short-term visits. Physicians and other health care providers who were not licensed as surgeons were excluded, even in countries where such providers may be permitted to perform certain operations. All surgical specialties were included in the surgeon category. Intensivists were excluded where they were registered separately from anaesthesiologists. Non-obstetrician gynaecologists were excluded where they were registered separately. WHO country names and regional classifications were used, along with the World Bank income classification (2014 revision), based on the per capita gross domestic product converted using the Atlas Method (Supplementary table 2).¹⁶ WHO member countries were also subdivided into five quintiles depending on the per capita total expenditure on health (PPP int. \$, 2012 or most recent value), with the 1st quintile consisting of the 39 lowest and the 5th quintile consisting of the 39 highest expenditure countries.

Country grouping by WHO Region, World Bank Income Category and Health Care Expenditure Quintiles

WHO Regions

African Region

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe

American Region

Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, United States of America, Uruguay, Venezuela (Bolivarian Republic of)

Eastern Mediterranean Region

Afghanistan, Bahrain, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen

European Region

Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan

South-East Asian Region

Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste

Western Pacific Region

Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Tonga, Tuvalu, Vanuatu, Viet Nam

World Bank Income Categories

High-income countries

Andorra, Antigua and Barbuda, Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei Darussalam, Canada, Chile, Cook Islands, Croatia, Cyprus, Czech Republic, Denmark, Equatorial Guinea, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Monaco, Nauru, Netherlands, New Zealand, Norway, Oman, Poland, Portugal, Qatar, Republic of Korea, Russian Federation, Saint Kitts and Nevis, San Marino, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States of America, Uruguay

Upper-middle income countries

Albania, Algeria, Angola, Argentina, Azerbaijan, Belarus, Belize, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, China, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, Fiji, Gabon, Grenada, Hungary, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kazakhstan, Lebanon, Libya, Malaysia, Maldives, Marshall Islands, Mauritius, Mexico, Montenegro, Namibia, Palau, Panama, Peru, Romania, Saint Lucia, Saint Vincent and the Grenadines, Serbia, Seychelles, South Africa, Suriname, Thailand, The former Yugoslav Republic of Macedonia, Tonga, Tunisia, Turkey, Turkmenistan, Tuvalu, Venezuela (Bolivarian Republic of)

Lower-middle income countries

Armenia, Bhutan, Bolivia (Plurinational State of), Cameroon, Cape Verde, Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Georgia, Ghana, Guatemala, Guyana, Honduras, India, Indonesia, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Mauritania, Micronesia (Federated States of), Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Republic of Moldova, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, South Sudan, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Timor-Leste, Ukraine, Uzbekistan, Vanuatu, Viet Nam, Yemen, Zambia

Low-income countries

Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Myanmar, Nepal, Niger, Niue, Rwanda, Sierra Leone, Somalia, Tajikistan,

Togo, Uganda, United Republic of Tanzania, Zimbabwe

Health Expenditure Quintiles*

5th Quintile

Andorra, Australia, Austria, Bahamas, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Niue, Norway, Palau, Portugal, Qatar, Republic of Korea, San Marino, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States of America

4th Quintile

Antigua and Barbuda, Argentina, Bahrain, Barbados, Belarus, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Chile, Costa Rica, Croatia, Equatorial Guinea, Estonia, Iran (Islamic Republic of), Kuwait, Latvia, Lebanon, Lithuania, Mexico, Montenegro, Oman, Panama, Poland, Romania, Russian Federation, Saint Kitts and Nevis, Saint Lucia, Saudi Arabia, Serbia, Seychelles, South Africa, The former Yugoslav Republic of Macedonia, Trinidad and Tobago, Turkey, United Arab Emirates, Uruguay

3rd Quintile

Albania, Algeria, Azerbaijan, Belize, China, Colombia, Cook Islands, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Gabon, Georgia, Grenada, Guatemala, Honduras, Jamaica, Jordan, Kazakhstan, Libya, Malaysia, Maldives, Marshall Islands, Mauritius, Micronesia (Federated States of), Namibia, Paraguay, Peru, Republic of Moldova, Saint Vincent and the Grenadines, Suriname, Swaziland, Thailand, Tunisia, Tuvalu, Ukraine, Venezuela (Bolivarian Republic of)

2nd Quintile

Angola, Armenia, Bhutan, Bolivia (Plurinational State of), Cambodia, Cape Verde, Congo, Côte d'Ivoire, Djibouti, Egypt, Fiji, Guyana, India, Indonesia, Iraq, Kiribati, Kyrgyzstan, Lesotho, Mongolia, Morocco, Nauru, Nicaragua, Nigeria, Papua New Guinea, Philippines, Rwanda, Samoa, Sao Tome and Principe, Sierra Leone, Solomon Islands, Sri Lanka, Sudan, Syrian Arab Republic, Tonga, Turkmenistan, Uzbekistan, Vanuatu, Viet Nam

1st Quintile

Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Haiti, Kenya, Lao People's Democratic Republic, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Pakistan, Senegal, Somalia, South Sudan, Tajikistan, Timor-Leste, Togo, Uganda, United Republic of Tanzania, Yemen, Zambia

* Zimbabwe and Democratic People's Republic of Korea were excluded due to lack of health expenditure data

Table S1. Data sources by country, tabulated by WHO regions, including year of data and most recent year of national physician workforce included in the WHO Global Health Observatory (<http://apps.who.int/gho/data/node.main?lang=en>)

	Surgeons, Anaesthesiologists and Obstetricians			Total physicians
Year	Data source	Comment	year	
African Region				
Algeria	2013	Statistiques Sanitaires, Ministère de la Santé de la Population et de la Réforme Hospitalière	2007	
Benin	2014	College des Jeunes Médecins du Bénin	2008	
Botswana	2014	Botswana Ministry of Health	2006	
Burkina Faso	2014	Burkina Faso Ministry of Health	2010	
Cameroon	2013	Society of Gynecologists and Obstetricians of Cameroon, Médecins du Cameroun	2009	
Cape Verde	2011	Relatório estatístico 2011, Ministry of Health	2010	
Central African Republic	2014	Système Nationale d'Information de Santé; Sassara Sarl et ACCESS Sarl	2009	
Chad	2013	Chad Surgical Society	2006	
Congo	2013	Congo-Brazzaville Surgical Society	2007	
Côte d'Ivoire	2014	Conseil National de l'Ordre des Médecins de Côte d'Ivoire; Société Ivoirienne d'Anesthésie Réanimation	2008	
Democratic Republic of the Congo	2013	Longombe, AO. La Cartographie des Medecins Specialistes dans les Quatre Grandes Disciplines Cliniques ainsi que l'Anesthésie-Reanimation en Republique Democratique Du Congo (RDC). (Mapping of Medical Specialists in the Four Great Clinical Specialities as well as Anesthesia in the Democratic Republic of the Congo) Great Lakes Medical Review 2014; 6 (2): 8-12	2004	
Eritrea	2008	Sharan M, Ahmed S, Ghebrehiwet M, Rogo K. The quality of the maternal health system in Eritrea. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics 2011; 115(3): 244-50.	2004	
Ethiopia	2014	Ethiopia Ministry of Health	2009	
Gabon	1999	Sanou et al. 1999	2004	
Gambia	2011	Gambia Medical and Dental Council; Directorate of Health Promotion and Education, The Gambia Ministry of Health and Social Welfare	2008	
Guinea	1999	Sanou et al. 1999	2005	
Kenya	2014	Kenya Medical Practitioners and Dentists Board	2011	
Lesotho	2014	Queen Mamohato Nemorial Hospital, Maseru, Lesotho	2003	
Liberia	2009	Liberia Institute of Statistics and Geo-Information Services (2010) The national census of health workers in Liberia 2009. Monrovia, Liberia	2008	
Madagascar	2013	l'Hôpital Universitaire Joseph Ravoahangy Andrianavalona	2007	
Malawi	2014	Medical Council of Malawi	2009	
Mali	2014	Société D'Anesthésie Réanimation Médecine D'urgence Du Mali (SARMU-Mali)	2010	
Mauritius	2014	Medical College of Mauritius	2004	
Mozambique	2013	Mozambique Ministry of Health	2012	
Niger	2014	Direction des Ressources Humaines/Ministère de la Santé Publique du Niger	2008	
Nigeria	2014	Medical and Dental Council of Nigeria	2009	
Rwanda	2014	Rwanda Medical and Dental Council and Rwanda Professional Societies	2010	
Senegal	2011	Senegal Ministry of Health	2008	
Seychelles	2014	Seychelles Ministry of health	2004	
Sierra Leone	2012	Ministry of Health and Sanitation	2010	
South Africa	2014	Health Professions Council of South Africa	2013	
Swaziland	2010	Dubowitz G, Detlefs S, McQueen KA. Global anesthesia workforce crisis: a preliminary survey revealing shortages contributing to undesirable outcomes and unsafe practices. World journal of surgery 2010; 34(3): 438-44.	2009	

Togo	2014	Clinique Medico Chirurgicale, Togo		2008
Uganda	2012	Linden AF, Sekidde FS, Galukande M, Knowlton LM, Chackungal S, McQueen KA. Challenges of surgery in developing countries: a survey of surgical and anesthesia capacity in Uganda's public hospitals. World journal of surgery 2012; 36(5): 1056-65.		2005
United Republic of Tanzania	2010	Ministry of Health of Tanzania		2006
Zambia	2012	The 2012 Annual Report; Health Professions Council of Zambia		2010
Zimbabwe	2014	The Medical and Dental Practitioners Council of Zimbabwe 2014 statistics		
American Region				
Antigua and Barbuda	2014	Antigua and Barbuda Ministry of Health		1999
Argentina	2014	Argentinean Federation of Anesthesiologists		2004
Barbados	2014	Barbados Ministry of Health		2005
Bolivia (Plurinational State of)	2012	Lebrun DG, Saavedra-Pozo I, Agreda-Flores F, Burdic ML, Notrica MR, McQueen KA. Surgical and anesthesia capacity in Bolivian public hospitals: results from a national hospital survey. World journal of surgery 2012; 36(11): 2559-66.		2011
Brazil	2013	Brazilian Medical Demography, Federal Council of Medicine		2013
Canada	2012	Canadian Institute for Health Information		2010
Chile	2012	Registro de Prestadores Individuales, Superintendencia de Salud		2009
Colombia	2014	Federación Médica Colombiana (Anesthesiologists); Rosselli D, Otero A, Heller D, Calderón C, Moreno S, Pérez A. Estimación de la oferta de médicos especialistas en Colombia con el método de captura-recaptura. Revista Panamericana de Salud Pública 2001; 9: 393-8.		2010
Costa Rica	2014	College of Physicians & Surgeons of Costa Rica		2013
Cuba	2013	Anuario Estadístico De Salud 2013		2010
Dominica	2014	Dominica Ministry of Health		2001
Ecuador	2014	Ecuador Ministry of Health		2009
El Salvador	2009	Molina G, et al. Evaluation of Surgical Care in El Salvador Using the WHO Surgical Vital Statistics. World J Surg (2013) 37:1227-1235		2008
Grenada	2014	Grenada Ministry of Health		2006
Guatemala	2014	Professional Societies; Surgery only covers general surgery		2009
Guyana	2014	Medical Council of Guyana		2010
Haiti	2014	Dr. Gerald Lerebours, via Tú M. TRÀN		1998
Honduras	2014	Colegio Médico de Honduras		2005
Jamaica	2014	Medical Council of Jamaica, University of the West Indies Department of Surgery, Radiology and Intensive Care		2008
Mexico	2012	Federación Mexicana de Colegios de Obstetricia y Ginecología (FEMECOG)		2011
Nicaragua	2014	Ministerio De Salud, Division General De Recursos Humanos, Distribución De Medicos Especialistas Por Departamento Y Municipio		2003
Panama	2014	Panama Ministry of Health, Dirección De Recursos Humanos, Dpto. De Estadística De Planificación		2011
Paraguay	2014	Paraguay Ministry of Health		2002
Peru	2014	Peruvian Society of Surgeons		2012
Saint Kitts and Nevis	2014	Saint Kitts and Nevis Ministry of Health, Chief Medical Officer		2001
Saint Lucia	2014	Saint Lucia Medical and Dental Council		2002
Saint Vincent and the Grenadines	2014	Saint Vincent and the Grenadines, Ministry of Health, Wellness and the Environment		2001
Trinidad and Tobago	2014	Medical Board of Trinidad and Tobago	Only those licenced	2007
United States of America	2011	American Medical Association (AMA) Database		2011
Uruguay	2014	Professional Society		2008
Venezuela (Bolivarian Republic of)	2014	Venezuelan Surgery Society; Veneuelan Obstetrics and Gynaecology Society		2001

Eastern Mediterranean Region				
Afghanistan	2010	Dubowitz G, Detlefs S, McQueen KA. Global anesthesia workforce crisis: a preliminary survey revealing shortages contributing to undesirable outcomes and unsafe practices. <i>World journal of surgery</i> 2010; 34(3): 438-44.		2011
Bahrain	2012	Kingdom of Bahrain Ministry of Health		2011
Djibouti	2013	Djibouti Ministry of Health		2006
Egypt	2014	Egyptian Medical Syndicate		2009
Iran (Islamic Republic of)	2014	Ministry of Health Office of Information and Statistics	Calculated based on density/10000 multiplied by Iran pop. (2012)	2005
Iraq	2013	Iraq Ministry of Health, Annual Statistical Report 2013		2010
Lebanon	2014	Lebanese Order of Physicians (Excludes North Lebanon Order of Physicians)		2011
Morocco	2011	Santé en Chiffres 2012, Report from the Morocco Ministry of Health		2009
Oman	2013	Oman Ministry of Health		2011
Pakistan	2012	Pakistan Medical and Dental Council		2010
Qatar	2011	The Hamad Medical Corporation, Annual Health Report (2011)		2010
Somalia	2014	Ministry of Health	Only Central and South Somalia	2006
Sudan	2014	Sudan Professional Societies		2008
Tunisia	2014	The National Medical Council of Tunisia	Only general surgeons	2010
Yemen	2014	Yemeni Board of Medical Specialization		2010
European Region				
Albania	Obstetricians: 2011 Others: 2009	WHO European Regional Office (2014) European database on human and technical resources for health (HlthRes-DB) (Accessed on September 18 2014): http://data.euro.who.int/HlthResDB/	Surgeons encompasses anaesthesiologists	2012
Andorra	2014	Andorra Ministry of Health		2003
Armenia	2014	Information and Analytic Center of the Ministry of Health		2012
Austria	2014	Austrian Medical Chamber		2011
Azerbaijan	2012	WHO European Regional Office (2014) European database on human and technical resources for health (HlthRes-DB) (Accessed on September 18 2014): http://data.euro.who.int/HlthResDB/	Surgeons encompasses anaesthesiologists	2012
Belarus	2013	Public Health in the Republic of Belarus – National Statistical Committee of the Republic of Belarus		2011
Belgium	2012	Institut National d'Assurance Maladie Invalidité		2011
Bosnia and Herzegovina	2013	Health Statistics Annual of Federation of Bosnia and Herzegovina (issued by: Institute for Public Health of Federation, Year XI, Issue XI, issued in Sarajevo in 2013., www.zzzjz.fbh.ba)	Excludes Republika Srpska	2010
Bulgaria	2011	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2011
Croatia	2010	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2011
Cyprus	2011	Statistical Service of Cyprus, Health and Hospital Statistics		2011
Czech Republic	2012	Institute of Health Information and Statistics of the Czech Republic		2011
Denmark	2009	Danish Health and Medicines Authority		2009
Estonia	2014	Estonia Health Board		2011
Finland	2014	Finnish Medical Association		2009
France	2013	Conseil National de l'Ordre des Médecins		2012
Georgia	2012	WHO European Regional Office (2014) European database on human and technical resources for health (HlthRes-DB) (Accessed on September 18 2014): http://data.euro.who.int/HlthResDB/	Surgeons encompasses anaesthesiologists	2012

Germany	2012	The Information System of the Federal Health Monitoring, Germany		2011
Greece	2012	National Statistical Data of Greece		2001
Hungary	2011	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2011
Iceland	2014	Register of Physicians, Directorate of Health		2012
Ireland	2014	Medical Council of Ireland		2012
Israel	2013	Israel Ministry of Health		2011
Italy	2011	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2011
Kazakhstan	2012	WHO European Regional Office (2014) European database on human and technical resources for health (HlthRes-DB) (Accessed on September 18 2014): http://data.euro.who.int/HlthResDB/	Surgeons encompasses anaesthesiologists	2012
Kyrgyzstan	2013	Kyrgyz Republic Ministry of Health		2012
Latvia	2014	Latvia Ministry of Health		2011
Lithuania	2011	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2012
Luxembourg	2012	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2012
Malta	2013	Malta Medical Council Registers: Specialists Register		2012
Monaco	2014	Monaco Ministry of Health		2012
Montenegro	2011	WHO European Regional Office (2014) European database on human and technical resources for health (HlthRes-DB) (Accessed on September 18 2014): http://data.euro.who.int/HlthResDB/	Surgeons encompasses anaesthesiologists	2011
Netherlands	2010	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2003
Norway	2012	Statistics Norway		2011
Poland	2014	Polish Department of Social Dialogue		2011
Portugal	2009	Statistics Portugal and Portugal Medical Association		2003
Republic of Moldova	2013	Republic of Moldova Ministry of Health		2012
Romania	2011	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 May 16]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2011
Russian Federation	2014	Russian Federation Ministry of Health		2006
San Marino	2014	Istituto per la Sicurezza Sociale (Public Healthcare Provider); Ordine dei medici e degli Odontoiatri		2012
Serbia	2012	WHO European Regional Office (2014) European database on human and technical resources for health (HlthRes-DB) (Accessed on September 18 2014): http://data.euro.who.int/HlthResDB/	Surgeons encompasses anaesthesiologists	2009
Slovakia	2014	Slovak Medical Chamber, Register of Health Professionals		2007
Slovenia	2013	Medical Chamber of Slovenia	Only members counted	2011
Spain	2014	Ministry of Health Report 2014		2012
Sweden	2011	The National Board of Health and Welfare		2007
Switzerland	2013	Eurostat and The Federal Office of Public Health		2011
Tajikistan	2014	Statistics and Medical Information Centre, Tajikistan Ministry of Health and Social Protection of the Population		2011
The former Yugoslav Republic of Macedonia	2011	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 June 17]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2009
Turkey	2011	Eurostat. Physicians by medical speciality Eurostat 2014 [cited 2014 June 17]. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=hlth_rs_spec&lang=en		2011
Turkmenistan	2014	Turkmenistan Ministry of Health		2002
Ukraine	2012	WHO European Regional Office (2014) European database on human and technical resources for health (HlthRes-DB) (Accessed on September 18 2014): http://data.euro.who.int/HlthResDB/	Surgeons encompasses anaesthesiologists	2012
United Kingdom	2012	UK General Medical Council		2012
Uzbekistan	2012	WHO European Regional Office (2014) European database on human and technical resources for health	Surgeons encompasses	2012

(HlthRes-DB) (Accessed on September 18 2014): <http://data.euro.who.int/HlthResDB/>

anaesthesiologists

South East Asian Region

Bangladesh	2012	Lebrun DG, Dhar D, Sarkar MI, Imran TM, Kazi SN, McQueen KA. Measuring global surgical disparities: a survey of surgical and anesthesia infrastructure in Bangladesh. World journal of surgery 2013; 37(1): 24-31.		2011
Bhutan	2014	Medical Superintendent, Jigme Dorji Wanchuck National Referral Hospital, Thimpu, Bhutan		2012
India	2009	Association of Surgeons of India, Indian Orthopaedic Association, Federation of Obstetric and Gynaecological Societies of India, Indian Society of Anaesthesiologists; reflects only membership numbers of these organizations	Based on membership of specialist societies.	2012
Maldives	2014	Maldives Medical Council		2010
Myanmar	2013	Myanmar Ministry of Health, Department of Medical Science		2012
Nepal	2014	Society of Surgeons of Nepal; Society of Anesthesiologists of Nepal; Nepal Society of Obstetricians and Gynaecologists		2004
Sri Lanka	2013	Sri Lanka Ministry of Health		2010
Thailand	2014	The Medical Council of Thailand		2010
Timor-Leste	2014	Timor-Leste Ministry of Health		2011

Western Pacific Region

Australia	2012	Australian Institute of Health and Welfare		2011
China	2012	National Health and Family Planning Commission of People's Republic of China	Calculated based on proportion of specialists to general physician workforce	2010
Cook Islands	2014	Cook Islands Ministry of Health workforce plan 2014-2020		2009
Fiji	2014	Fiji Medical Council		2009
Japan	Surgeons: 2013 Others: 2012	Surgeons: Japanese Board of Medical Specialities (http://www.japan-senmon-i.jp/data/); Obstetricians and Anesthesiologists: Japanese Ministry of Health (http://www.mhlw.go.jp/toukei/saikin/hw/ishi/12/dl/gaikyo.pdf)		2010
Kiribati	2014	Medical Council Register at the Kiribati Ministry of Health and Medical Services		2010
Lao People's Democratic Republic	2014	Surgeons: University of health Sciences of Lao PDR; Anaesthesiologists: Lao Society of Anesthesiologists; Obstetricians: Lao Association of Obstetric Gynecology		2012
Malaysia	2011	Malaysia National Healthcare Establishment & Workforce Statistics 2011		2010
Marshall Islands	2011	Ministry of Health Republic of the Marshall Islands Annual Report Fy 2011		2010
Micronesia (Federated States of)	2014	Micronesia Anesthesia Society Database		2009
Mongolia	2013	National Center of Health Development, Mongolia Ministry of Health		2008
Nauru	2014	Report of the Royal Australasian College of Surgeons		2010
New Zealand	2014	Medical Council of New Zealand		2010
Niue	2014	Niue Health Department Data		2008
Papua New Guinea	2014	Papua New Guinea Obstetrics and Gynaecology Society		2008
Philippines	2014	Philippine College of Surgeons; Philippine Obstetrics and Gynecologists Society; Philippine Society of Anesthesiologists		2004
Republic of Korea	2014	National Health Insurance Service (NHIS) and Health Insurance Review and Assessment Service (HIRA)		2012
Samoa	2014	Samoa National Health Services		2008
Singapore	2013	Singapore Medical Council		2010
Solomon Islands	2011	Natuzzi ES, Kushner A, Jagilly R, et al. Surgical care in the Solomon Islands: a road map for universal surgical care delivery. World journal of surgery 2011; 35(6): 1183-93.		2009
Tonga	2014	Ministry of Health, Tonga		2010
Vanuatu	2014	Vanuatu Ministry Of Health		2008

Table S2. Characteristics of the 167 countries with workforce data, by World Bank Income Category, WHO Region and Health Expenditure Quintiles

	Countries		Population ¹	
	n	%	n	%
Total Sample	167	86%	6,512	92%
World Bank Income Categories				
High	51	90%	1,224	97%
Upper middle	45	83%	2,388	98%
Lower middle	41	85%	2,122	84%
Low	30	86%	778	94%
WHO Regions				
African region	37	79%	827	92%
American region	31	89%	946	99%
Eastern Mediterranean region	15	71%	526	87%
European region	53	100%	904	100%
Southeast Asian region	9	82%	1,565	85%
Western Pacific region	22	82%	1,744	94%
Health Expenditure Quintiles²				
5th	37	95%	1,015	100%
4th	33	87%	853	95%
3rd	31	82%	1,796	99%
2nd	32	84%	1,827	82%
1st	33	85%	1,007	95%

¹Population in millions

²Zimbabwe and Democratic People's Republic of Korea were excluded due to lack of health expenditure data

Table S3. National indicators¹ used as predictors for the imputation of density of surgeons, anaesthesiologists and obstetricians. 100 imputations and with restriction to absolute values.

Births attended by skilled health staff (% of total)
Corruption Perception Index
Fertility rate, total (births per woman)
GNI per capita, Atlas method (current US\$)
Health expenditure per capita (current US\$)
Immunization, measles (% of children ages 12-23 months)
Improved water source (% of population with access)
Labor force, female (% of total labor force)
Maternal mortality ratio (modeled estimate, per 100,000 live births)
Mortality rate, infant (per 1,000 live births)
Mortality rate, under-5 (per 1,000 live births)
Nurses and midwives (per 1,000 people)
Out-of-pocket health expenditure (% of total expenditure on health)
Physicians (per 1,000 people)
Population growth (annual %)
Urban population growth (annual %)

1. World Bank. World DataBank. 2014. <http://databank.worldbank.org/data/home.aspx>.

Table S4. National number and density of surgeons, anaesthesiologists and obstetricians per 100,000 population, tabulated by WHO region.

WHO Name	Population ¹	Surgeons		Anaesthesiologists		Obstetricians		Total	
		n	density	n	density	n	density	n	density
African Region									
Algeria	385	3204	8.3	825	2.1	599	1.6	4628	12.0
Angola	208	–	–	–	–	–	–	–	–
Benin	101	81	0.8	20	0.2	90	0.9	191	1.9
Botswana	20	40	2.0	18	0.9	18	0.9	76	3.8
Burkina Faso	165	36	0.2	58	0.4	10	0.1	104	0.6
Burundi	99	–	–	–	–	–	–	–	–
Cameroon	217	83	0.4	22	0.1	151	0.7	256	1.2
Cape Verde	5	57	11.5	11	2.2	12	2.4	80	16.2
Central African Republic	45	9	0.2	0	0.0	8	0.2	17	0.4
Chad	124	18	0.1	2	0.0	13	0.1	33	0.3
Comoros	7	–	–	–	–	–	–	–	–
Congo	43	7	0.2	0	0.0	3	0.1	10	0.2
Côte d'Ivoire	198	318	1.6	80	0.4	238	1.2	636	3.2
Democratic Republic of the Congo	657	54	0.1	32	0.0	39	0.1	125	0.2
Equatorial Guinea	7	–	–	–	–	–	–	–	–
Eritrea	61	–	–	1	0.0	17	0.3	–	–
Ethiopia	917	349	0.4	44	0.0	147	0.2	540	0.6
Gabon	16	–	–	15	0.9	–	–	–	–
Gambia	18	10	0.6	1	0.1	8	0.4	19	1.1
Ghana	254	–	–	–	–	–	–	–	–
Guinea	115	–	–	6	0.1	–	–	–	–
Guinea-Bissau	17	–	–	–	–	–	–	–	–
Kenya	432	316	0.7	129	0.3	357	0.8	802	1.9
Lesotho	21	4	0.2	5	0.2	3	0.1	12	0.6
Liberia	42	23	0.5	–	–	–	–	–	–
Madagascar	223	90	0.4	28	0.1	21	0.1	139	0.6
Malawi	159	61	0.4	11	0.1	7	0.0	79	0.5
Mali	149	151	1.0	21	0.1	–	–	–	–
Mauritania	38	–	–	–	–	–	–	–	–
Mauritius	12	88	7.1	67	5.4	79	6.4	234	18.9
Mozambique	252	186	0.7	28	0.1	63	0.2	277	1.1
Namibia	23	–	–	–	–	–	–	–	–
Niger	172	31	0.2	6	0.0	42	0.2	79	0.5
Nigeria	1690	1827	1.1	144	0.1	454	0.3	2425	1.4
Rwanda	115	42	0.4	15	0.1	25	0.2	82	0.7
Sao Tome and Principe	2	–	–	–	–	–	–	–	–
Senegal	137	38	0.3	42	0.3	57	0.4	137	1.0
Seychelles	1	22	23.9	4	4.3	6	6.5	32	34.8
Sierra Leone	60	5	0.1	1	0.0	3	0.1	9	0.2
South Africa	524	3453	6.6	1143	2.2	1631	3.1	6227	11.9
South Sudan	108	–	–	–	–	–	–	–	–
Swaziland	12	–	–	2	0.2	–	–	–	–
Togo	66	20	0.3	6	0.1	10	0.2	36	0.5

Uganda	363	204	0.6	17	0.05	124	0.3	345	0.9
United Republic of Tanzania	478	100	0.2	6	0.0	50	0.1	156	0.3
Zambia	141	97	0.7	13	0.1	46	0.3	156	1.1
Zimbabwe	137	80	0.6	48	0.3	63	0.5	191	1.4
American Region									
Antigua and Barbuda	1	5	5.6	2	2.2	6	6.7	13	14.6
Argentina	411	–	–	4500	11.0	–	–	–	–
Bahamas	4	–	–	–	–	–	–	–	–
Barbados	3	18	6.4	19	6.7	12	4.2	49	17.3
Belize	3	–	–	–	–	–	–	–	–
Bolivia (Plurinational State of)	105	1807	17.2	1270	12.1	500	4.8	3577	34.1
Brazil	1990	70298	35.3	25032	12.6	22511	11.3	11784	59.2
								1	
Canada	348	7352	21.1	1995	5.7	3070	8.8	12417	35.6
Chile	175	7137	40.9	2322	13.3	1931	11.1	11390	65.2
Colombia	477	2776	5.8	2634	5.5	2338	4.9	7748	16.2
Costa Rica	48	406	8.4	280	5.8	375	7.8	1061	22.1
Cuba	113	8026	71.2	1806	16.0	3001	26.6	12833	113.9
Dominica	1	2	2.8	2	2.8	4	5.6	8	11.1
Dominican Republic	103	–	–	–	–	–	–	–	–
Ecuador	155	5461	35.3	1996	12.9	2016	13.0	9473	61.1
El Salvador	63	1222	19.4	118	1.9	–	–	–	–
Grenada	1	3	2.9	2	1.9	7	6.7	12	11.4
Guatemala	151	201	1.3	155	1.0	188	1.2	544	3.6
Guyana	8	45	5.7	9	1.1	13	1.6	67	8.4
Haiti	102	115	1.1	60	0.6	300	2.9	475	4.7
Honduras	79	444	5.6	147	1.9	498	6.3	1089	13.7
Jamaica	28	183	6.6	40	1.4	99	3.6	322	11.6
Mexico	1210	25900	21.4	8750	7.2	14455	11.9	49105	40.6
Nicaragua	60	524	8.7	157	2.6	269	4.5	950	15.9
Panama	38	423	11.1	209	5.5	391	10.3	1023	26.9
Paraguay	67	356	5.3	157	2.3	429	6.4	942	14.1
Peru	300	8804	29.4	1382	4.6	2679	8.9	12865	42.9
Saint Kitts and Nevis	1	6	11.1	3	5.6	8	14.8	17	31.5
Saint Lucia	2	20	11.0	7	3.9	15	8.3	42	23.2
Saint Vincent and the Grenadines	1	4	3.7	2	1.8	8	7.3	14	12.8
Suriname	5	–	–	–	–	–	–	–	–
Trinidad and Tobago	13	247	18.5	75	5.6	99	7.4	421	31.5
United States of America	3180	114679	36.1	46446	14.6	40123	12.6	20124	63.3
								8	
Uruguay	34	400	11.8	330	9.7	600	17.7	1330	39.2
Venezuela (Bolivarian Republic of)	300	3411	11.4	–	–	2154	7.2	–	–
Eastern Mediterranean Region									
Afghanistan	298	–	–	8	0.03	–	–	–	–
Bahrain	13	201	15.3	67	5.1	58	4.4	326	24.7
Djibouti	9	17	2.0	9	1.0	13	1.5	39	4.5
Egypt	807	23966	29.7	5533	6.9	15363	19.0	44862	55.6

Iran (Islamic Republic of)	764	1272	1.7	1421	1.9	1197	1.6	3890	5.1
Iraq	328	1071	3.3	488	1.5	974	3.0	2533	7.7
Jordan	70	–	–	–	–	–	–	–	–
Kuwait	33	–	–	–	–	–	–	–	–
Lebanon	46	2547	54.8	486	10.5	941	20.2	3974	85.5
Libya	62	–	–	–	–	–	–	–	–
Morocco	325	2534	7.8	320	1.0	1064	3.3	3918	12.0
Oman	33	556	16.8	192	5.8	195	5.9	943	28.5
Pakistan	1790	2239	1.3	2722	1.5	4951	2.8	9912	5.5
Qatar	21	67	3.3	128	6.2	81	3.9	276	13.5
Saudi Arabia	283	–	–	–	–	–	–	–	–
Somalia	102	15	0.1	1	0.001	5	0.05	21	0.2
Sudan	372	300	0.8	250	0.7	500	1.3	1050	2.8
Syrian Arab Republic	219	–	–	–	–	–	–	–	–
Tunisia	109	327	3.0	255	2.3	695	6.4	1277	11.7
United Arab Emirates	92	–	–	–	–	–	–	–	–
Yemen	239	104	0.4	15	0.1	93	0.4	212	0.9
European Region									
Albania	32	–	–	–	–	45	1.4	206	6.5
Andorra	1	20	25.6	10	12.8	14	17.9	44	56.4
Armenia	30	1011	34.1	419	14.1	784	26.4	2214	74.6
Austria	85	7767	91.8	1761	20.8	2518	29.7	12046	142.3
Azerbaijan	93	–	–	–	–	1982	21.3	5850	62.8
Belarus	94	6428	68.3	2466	26.2	2590	27.5	11484	122.1
Belgium	111	5571	50.4	2281	20.6	1541	13.9	9393	84.9
Bosnia and Herzegovina	38	275	7.2	54	1.4	115	3.0	444	11.6
Bulgaria	73	4716	64.8	1386	19.0	1439	19.8	7541	103.6
Croatia	43	1822	42.3	730	16.9	777	18.0	3329	77.3
Cyprus	11	143	12.7	32	2.8	57	5.0	232	20.5
Czech Republic	107	7762	72.8	2581	24.2	2876	27.0	13219	124.0
Denmark	56	1641	29.3	278	5.0	264	4.7	2183	39.0
Estonia	13	189	14.6	536	41.5	938	72.7	1663	128.8
Finland	54	4081	75.5	933	17.3	1000	18.5	6014	111.2
France	639	18793	29.4	7076	11.1	10247	16.0	36116	56.5
Georgia	44	–	–	–	–	1453	33.3	3212	73.7
Germany	828	44449	53.7	23468	28.3	25752	31.1	93669	113.1
Greece	111	10011	90.0	2843	25.6	1867	16.8	14721	132.3
Hungary	100	3189	32.0	1220	12.2	1245	12.5	5654	56.7
Iceland	3	167	51.2	45	13.8	55	16.9	267	81.9
Ireland	46	680	14.9	197	4.3	454	9.9	1331	29.1
Israel	76	3161	41.4	1049	13.7	636	8.3	4846	63.4
Italy	609	12146	19.9	13977	23.0	13090	21.5	39213	64.4
Kazakhstan	163	–	–	–	–	4816	29.6	12237	75.2
Kyrgyzstan	55	1868	34.1	592	10.8	994	18.2	3454	63.1
Latvia	21	1055	51.2	453	22.0	405	19.7	1913	92.9
Lithuania	30	1879	62.1	696	23.0	1316	43.5	3891	128.5
Luxembourg	5	275	52.5	80	15.3	92	17.6	447	85.3
Malta	4	182	42.5	51	11.9	82	19.2	315	73.6

Monaco	0	42	110.5	23	60.5	8	21.1	73	192.1
Montenegro	6	–	–	–	–	101	16.3	335	53.9
Netherlands	167	4946	29.6	1252	7.5	1672	10.0	7870	47.1
Norway	50	3751	75.1	783	15.7	1040	20.8	5574	111.6
Poland	382	5954	15.6	6051	15.8	4812	12.6	16817	44.0
Portugal	106	5060	47.7	1533	14.5	1520	14.3	8113	76.5
Republic of Moldova	35	563	16.0	553	15.7	641	18.2	1757	50.0
Romania	218	8204	37.7	2279	10.5	1666	7.7	12149	55.8
Russian Federation	1430	23842	16.7	38050	26.6	28894	20.2	90786	63.5
San Marino	0	17	54.8	12	38.7	7	22.6	36	116.1
Serbia	96	–	–	–	–	1317	13.8	5185	54.3
Slovakia	54	1001	18.4	1136	20.9	961	17.6	3098	56.9
Slovenia	21	749	36.2	431	20.8	415	20.1	1595	77.1
Spain	468	10673	22.8	4869	10.4	4018	8.6	19560	41.8
Sweden	95	2472	26.0	1319	13.9	1549	16.3	5340	56.1
Switzerland	80	4091	51.2	1431	17.9	1699	21.2	7221	90.3
Tajikistan	80	1309	16.3	645	8.1	1486	18.6	3440	43.0
The former Yugoslav Republic of Macedonia	21	763	36.2	359	17.0	213	10.1	1335	63.4
Turkey	740	6104	8.2	5431	7.3	6324	8.5	17859	24.1
Turkmenistan	52	1572	30.4	694	13.4	756	14.6	3022	58.4
Ukraine	455	–	–	–	–	12745	28.0	45608	100.2
United Kingdom	628	21684	34.5	6080	9.7	12431	19.8	40195	64.0
Uzbekistan	285	–	–	–	–	5549	19.4	12975	45.5
South East Asia Region									
Bangladesh	1550	2615	1.7	1200	0.8	850	0.5	4665	3.0
Bhutan	7	6	0.8	3	0.4	13	1.8	22	3.0
Democratic People's Republic of Korea	248	–	–	–	–	–	–	–	–
India	12400	31560	2.5	20280	1.6	29310	2.4	81150	6.5
Indonesia	2470	–	–	–	–	–	–	–	–
Maldives	3	6	1.8	2	0.6	13	3.8	21	6.2
Myanmar	528	478	0.9	310	0.6	466	0.9	1254	2.4
Nepal	275	254	0.9	193	0.7	336	1.2	783	2.8
Sri Lanka	211	118	0.6	128	0.6	129	0.6	375	1.8
Thailand	668	4284	6.4	1523	2.3	3154	4.7	8961	13.4
Timor-Leste	11	5	0.4	1	0.1	1	0.1	7	0.6
Western Pacific Region									
Australia	231	5642	24.5	1669	7.2	4704	20.4	12015	52.1
Brunei Darussalam	4	–	–	–	–	–	–	–	–
Cambodia	149	–	–	–	–	–	–	–	–
China	13900	293021	21.1	194634	14.0	53471	3.8	54112	38.9
Cook Islands	0	1	4.8	1	4.8	1	4.8	3	14.3
Fiji	9	16	1.8	9	1.0	12	1.4	37	4.2
Japan	1270	21275	16.8	8140	6.4	10412	8.2	39827	31.4
Kiribati	1	1	1.0	2	2.0	2	2.0	5	5.0
Lao People's Democratic Republic	66	65	1.0	60	0.9	66	1.0	191	2.9
Malaysia	292	1967	6.7	684	2.3	836	2.9	3487	11.9

Marshall Islands	1	6	11.3	1	1.9	2	3.8	9	17.0
Micronesia (Federated States of)	1	11	10.7	7	6.8	11	10.7	29	28.2
Mongolia	28	403	14.4	296	10.6	682	24.4	1381	49.4
Nauru	0	1	10.0	1	10.0	1	10.0	3	30.0
New Zealand	45	821	18.4	264	5.9	689	15.4	1774	39.8
Niue	0	1	100.0	0	0.0	1	100.0	2	200.0
Palau	0	–	–	–	–	–	–	–	–
Papua New Guinea	72	36	0.5	24	0.3	18	0.3	78	1.1
Philippines	967	2500	2.6	3611	3.7	3362	3.5	9473	9.8
Republic of Korea	490	15792	32.2	3771	7.7	5463	11.1	25026	51.1
Samoa	2	5	2.6	4	2.1	5	2.6	14	7.4
Singapore	53	1019	19.2	375	7.1	304	5.7	1698	32.0
Solomon Islands	6	5	0.9	3	0.5	4	0.7	12	2.2
Tonga	1	3	2.9	1	1.0	1	1.0	5	4.8
Tuvalu	0	–	–	–	–	–	–	–	–
Vanuatu	2	5	2.0	2	0.8	2	0.8	9	3.6
Viet Nam	908	–	–	–	–	–	–	–	–

¹ Population in 100,000s

Albania, Azerbaijan, Belarus, Georgia, Kazakhstan, Montenegro, Serbia, Turkmenistan, Ukraine and Uzbekistan provided aggregated data on the number of surgeons and anaesthesiologists (“surgical group of specialists”)

For inquiries about the dataset and to contribute by validating or updating individual data points, please refer to [www http://www.who.int/surgery/eesc_database/en/](http://www.who.int/surgery/eesc_database/en/).

Table S5. The global distribution of surgeons, anaesthesiologists and obstetricians, by World Bank Income Category, WHO Region and Health Expenditure Quintiles. Median with [interquartile range]. Based on collected and imputed values.

	Population*		Surgeons**			Anesthesiologists**			Obstetricians**			Total**		
	n	%	n	IQR	%	n	IQR	%	n	IQR	%	n	IQR	%
Global	7054	100	1113	[1059–1178]	100	550	[529–573]	100	483	[456–518]	100	2146	[2052–2259]	100
World Bank Income Categories														
High	1267	18	393	[389–397]	35	193	[191–194]	35	194	[192–196]	40	780	[773–788]	36
Upper middle	2435	35	504	[494–515]	45	274	[270–277]	50	148	[144–154]	31	925	[910–943]	43
Lower middle	2522	36	191	[158–232]	17	76	[62–92]	14	125	[108–146]	26	392	[334–464]	18
Low	830	12	25	[18–33]	2	7	[6–9]	1	17	[11–22]	3	49	[35–65]	2
WHO Regions														
African region	904	13	30	[23–40]	3	9	[7–12]	2	15	[10–21]	3	54	[40–73]	3
American region	958	14	274	[270–280]	25	103	[102–104]	19	106	[104–109]	22	483	[476–493]	23
Eastern Mediterranean region	601	9	62	[52–71]	6	19	[17–22]	4	36	[31–41]	7	117	[101–134]	5
European region	904	13	284	[280–290]	26	154	[151–157]	28	169	[169–169]	35	607	[607–607]	28
Southeast Asian region	1837	26	97	[78–121]	9	41	[33–51]	8	64	[53–78]	13	202	[164–250]	9
Western Pacific region	1850	26	366	[356–377]	33	223	[220–227]	41	94	[89–99]	19	683	[665–702]	32
Health Expenditure Quintiles***														
5th	1016	14	341	[341–341]	31	140	[140–140]	25	152	[152–152]	32	633	[633–633]	30
4th	895	13	200	[192–209]	18	109	[108–111]	20	104	[101–109]	22	414	[402–429]	19
3rd	1822	26	375	[369–381]	34	224	[220–228]	41	98	[96–100]	20	696	[691–702]	32
2nd	2223	32	163	[133–202]	15	65	[52–80]	12	105	[88–125]	22	333	[274–405]	16
1st	1060	15	27	[20–35]	2	9	[8–11]	2	19	[15–25]	4	56	[43–71]	3

* Population in millions

** Providers in 1000s

*** Zimbabwe and Democratic People's Republic of Korea were excluded due to lack of health expenditure data

Table S6. The density of surgeons, anaesthesiologists and obstetricians per 100,000 population, by World Bank Income Category, WHO Region and Health Expenditure Quintiles. Median with [interquartile range].

	Surgeons		Anesthesiologists		Obstetricians		Total	
	/100,000		/100,000		/100,000		/100,000	
Global	8.7	[1.1–29.4]	3.7	[0.6–11.9]	6.4	[1.2–16.8]	23.2	[3.8–58.4]
World Bank Income Categories								
High	29.3	[16.7–51.2]	13.3	[6.4–20.8]	16.0	[8.6–20.1]	56.9	[32.0–85.3]
Upper middle	8.4	[3.7–30.4]	4.3	[1.9–11.0]	7.2	[3.6–12.5]	22.6	[11.6–56.7]
Lower middle	2.0	[0.8–8.7]	1.0	[0.3–2.3]	2.0	[0.7–6.4]	5.5	[1.8–28.2]
Low	0.5	[0.2–0.9]	0.1	[0.03–0.3]	0.2	[0.1–0.8]	0.7	[0.5–1.9]
WHO Regions								
African region	0.5	[0.2–1.0]	0.1	[0.05–0.4]	0.3	[0.1–0.9]	1.0	[0.5–1.9]
American region	11.1	[5.6–21.1]	5.5	[1.9–9.7]	7.3	[4.9–11.1]	22.6	[13.3–39.9]
Eastern Mediterranean region	3.1	[1.3–15.3]	1.5	[0.7–5.8]	3.1	[1.5–5.9]	9.7	[4.5–24.7]
European region	36.2	[22.8–52.5]	15.7	[11.1–20.9]	18.2	[13.8–21.2]	64.0	[54.3–92.9]
Southeast Asian region	0.9	[0.8–1.8]	0.6	[0.6–0.8]	1.2	[0.6–2.4]	3.0	[2.4–6.2]
Western Pacific region	8.4	[2–18.4]	3.0	[1–7.1]	3.8	[1.4–10.7]	15.6	[4.8–38.9]
Health Expenditure Quintiles¹								
5th	34.5	[22.8–52.5]	13.7	[7.2–20.6]	16.8	[10.0–20.4]	63.4	[47.1–90.3]
4th	16.1	[8.4–37.7]	7.3	[5.1–16.9]	10.7	[6.6–17.9]	39.9	[23.7–64.4]
3rd	6.7	[4.2–13.7]	2.3	[1.9–5.4]	6.4	[3.8–11.8]	14.3	[11.7–50.0]
2nd	2.5	[0.8–10.0]	1.0	[0.4–3.7]	1.9	[0.8–4.6]	5.7	[2.5–23.1]
1st	0.5	[0.3–0.9]	0.1	[0.04–0.3]	0.3	[0.1–0.8]	1.0	[0.5–2.1]

¹Zimbabwe and Democratic People's Republic of Korea were excluded due to lack of health expenditure data