

Modell's

Haemoglobinopathologist's

Almanac

Epidemiological Estimates for Haemoglobin Disorders: WHO Western Pacific Region by Country

Comprising the following charts and tables:

- Chart 1: Population
- Chart 2: Annual births
- Chart 3: Crude birth rate and infant mortality rate
- Chart 4: Per cent of pregnant women carrying alpha globin gene variants, by variant
- Chart 5: Per cent of pregnant women carrying beta globin gene variants, by variant
- Chart 6: Per cent of pregnant women carrying any haemoglobin gene variant
- Chart 7: Conceptions/1000 with combinations of significant variants
- Chart 8: Annual pregnant carriers of significant variants
- Chart 9: Annual pregnancies where both parents carry a significant variant
- Chart 10: Annual conceptions with combinations of significant gene variants

Charts and tables compiled showing conservative estimates based on best available data presented on the World Wide Web in May 2007 by Professor Bernadette Modell (b.modell@pcps.ucl.ac.uk) and Matthew Darlison (m.darlison@ucl.ac.uk), UCL Centre for Health Informatics and Multiprofessional Education (CHIME) and World Health Organisation Collaborating Centre for the Community Control of Hereditary Disorders.

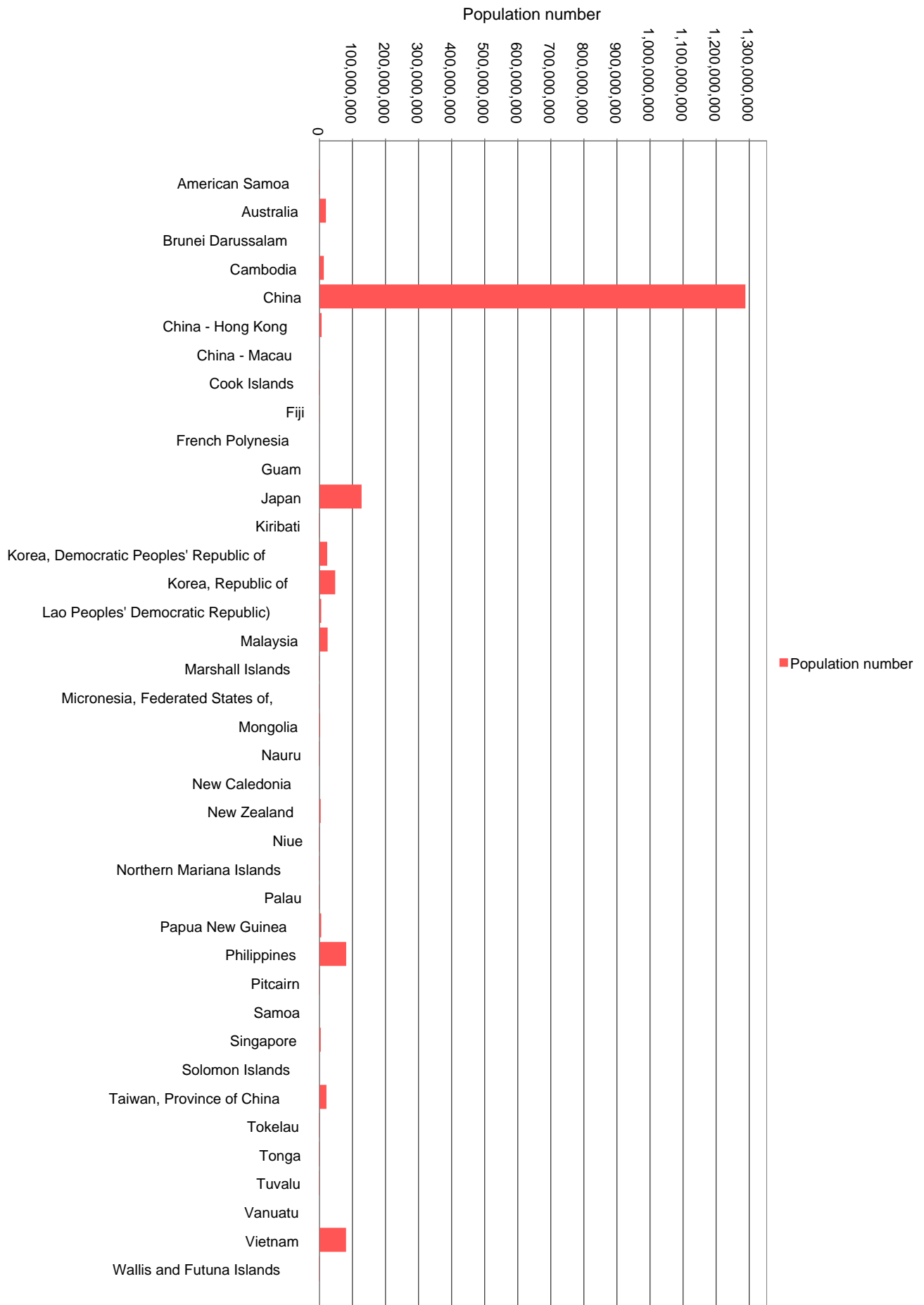
Definitions used

In terms of alpha globin genotypes, we define as pathological homozygous alpha zero thalassaemia (causes hydrops fetalis) and the combination of alpha zero and alpha plus thalassaemia (causes haemoglobin H disease). Homozygous alpha plus thalassaemia is not considered to cause pathology. In terms of beta globin genotypes, we define as pathological haemoglobin S/C, homozygous haemoglobin S (SS), haemoglobin S/beta thalassaemia, homozygous beta thalassaemia, haemoglobin E/beta thalassaemia and some rare combinations. We define as harmless homozygous haemoglobin C (CC), haemoglobin C/beta thalassaemia, homozygous haemoglobin E (EE), homozygous haemoglobin D (DD), haemoglobin D/beta thalassaemia, and some other rare combinations.

WHO Regions are constituted as follows:

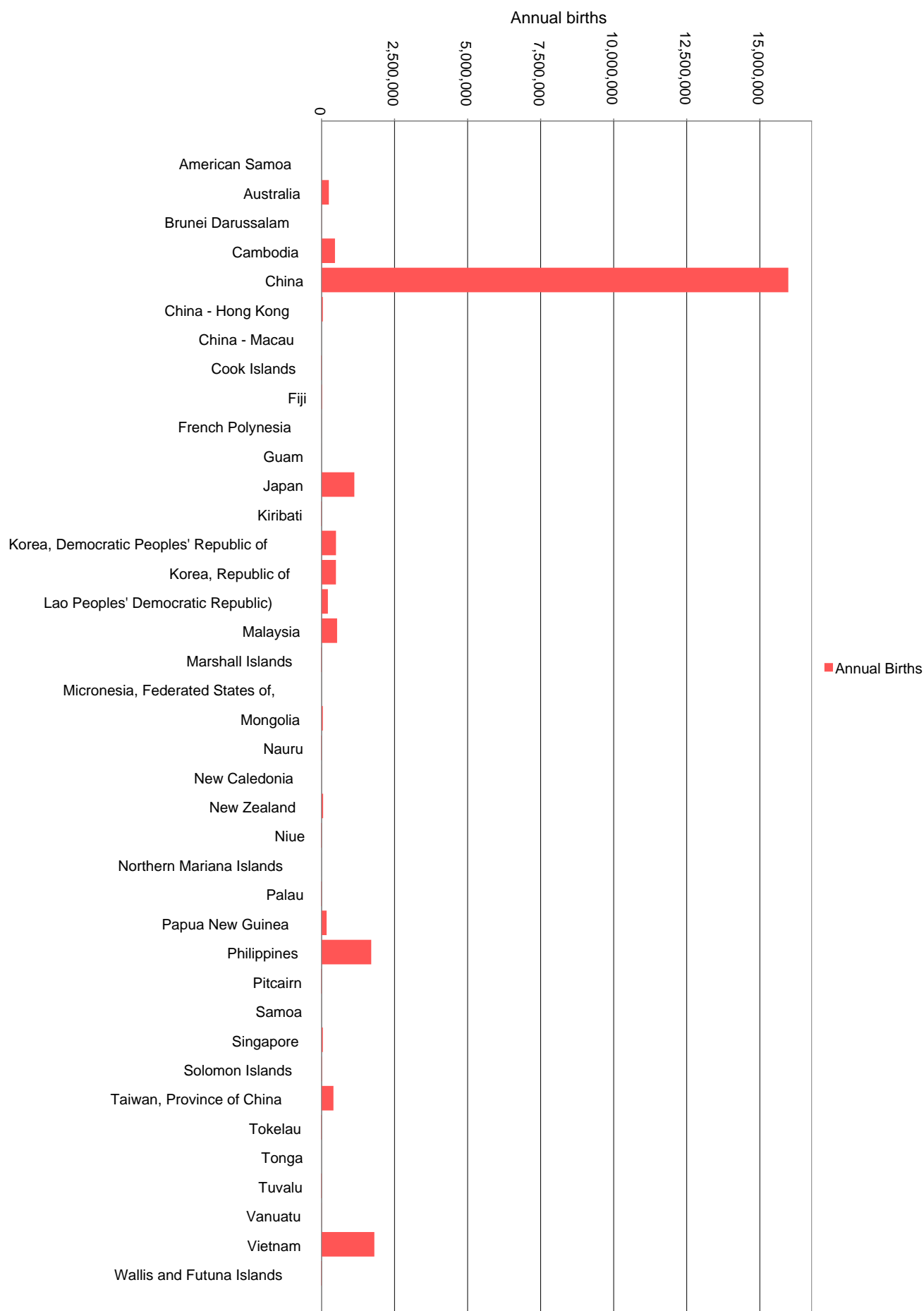
African Region (AFR)	American Region (AMR)	Eastern Mediterranean Region (EMR)	European Region (EUR)	South East Asian Region (SEAR)	Western Pacific Region (WPR)
Northern Africa: Algeria Western Africa: Benin, Burkina Faso, Cote d'Ivoire, Cape Verde, Gambia, Guinea-Bissau, Ghana, Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Sierra Leone, Saint Helena, Senegal, Togo Middle Africa: Angola, Central African Republic, Cameroon, Chad, Congo, Democratic Republic of the Congo (formerly Zaire), Equatorial Guinea, Gabon, Sao Tome and Principe Eastern Africa: Burundi, Comoros, Kenya, Madagascar, Malawi, Mauritius, Mayotte, Mozambique, Reunion, Rwanda, Seychelles, United Republic of Tanzania, Uganda, Zambia, Zimbabwe Southern Africa: Botswana, Lesotho, Namibia, South Africa, Swaziland	Northern America: Bermuda, Canada, Greenland, Saint Pierre and Miquelon, United States Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama Caribbean: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, British Virgin Islands, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Netherlands Antilles, Puerto Rico, Saint Kitt's and Nevis, Saint Vincent and the Grenadines, Saint Lucia, Trinidad and Tobago, Turks and Caicos Islands, US Virgin Islands South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Falkland Islands, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela	Northern Africa: Libyan Arab Jamahiriya, Morocco, Sudan, Tunisia, Western Sahara Eastern Africa: Djibouti, Egypt, Eritrea, Ethiopia, Somalia Western Asia: Bahrain, Cyprus, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen South Central Asia: Afghanistan, Iran, Islamic Republic of, Pakistan, Occupied Palestinian territory	Northern Europe: Channel Islands, Denmark, Estonia, Faroe Islands, Finland, Isle of Man, Iceland, Ireland, Latvia, Lithuania, Norway, Sweden, United Kingdom Western Europe: Austria, Belgium, France, Germany, Liechtenstein, Luxembourg, Monaco, Netherlands, Switzerland Southern Europe: Albania, Andorra, Bosnia and Herzegovina, Croatia, Gibraltar, Greece, Italy, The former Yugoslav Republic of Macedonia, Malta, Portugal, San Marino, Slovenia, Spain, Yugoslavia Eastern Europe: Belarus, Bulgaria, Czech Republic, Hungary, Republic of Moldova, Poland, Romania, Russian Federation, Slovakia, Ukraine South Central Asia: Kazakhstan, Kyrgyzstan, Tadjikistan, Turkmenistan, Uzbekistan Western Asia: Armenia, Azerbaijan, Georgia, Israel, Turkey	South Central Asia: Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka South Eastern Asia: East Timor, Indonesia, Myanmar, Thailand	Eastern Asia: China, China - Hong Kong, Japan, Korea, Democratic Peoples' Republic of, Korea, Republic of, China - Macau, Mongolia, Taiwan, Province of China South Eastern Asia: Brunei Darussalam, Cambodia, Heard Island and McDonald Islands, Lao Peoples' Democratic Republic, Malaysia, Philippines, Singapore, Vietnam Melanesia, Micronesia, Polynesia: American Samoa, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia, Federated States of New Caledonia, Northern Mariana Islands, Nauru, Niue, Palau, Pitcairn, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna Islands Australia and New Zealand: Australia, New Zealand

Chart 1: Population



<i>Country</i>	<i>Population number</i>
American Samoa	58,000
Australia	19,873,000
Brunei Darussalam	350,000
Cambodia	13,415,000
China	1,288,400,000
China - Hong Kong	6,803,000
China - Macau	445,000
Cook Islands	18,000
Fiji	806,000
French Polynesia	247,000
Guam	164,000
Japan	127,649,000
Kiribati	83,000
Korea, Democratic Peoples' Republic of	23,702,000
Korea, Republic of	47,925,000
Lao Peoples' Democratic Republic)	5,500,000
Malaysia	25,048,000
Marshall Islands	57,000
Micronesia, Federated States of,	120,000
Mongolia	2,504,000
Nauru	12,000
New Caledonia	220,000
New Zealand	4,009,000
Niue	2,000
Northern Mariana Islands	76,000
Palau	20,000
Papua New Guinea	5,462,000
Philippines	81,081,000
Pitcairn	66
Samoa	171,000
Singapore	4,185,000
Solomon Islands	430,000
Taiwan, Province of China	21,463,000
Tokelau	1,000
Tonga	101,000
Tuvalu	11,000
Vanuatu	174,000
Vietnam	80,670,000
Wallis and Futuna Islands	14,000
WHO Western Pacific Region population total	1,761,269,066

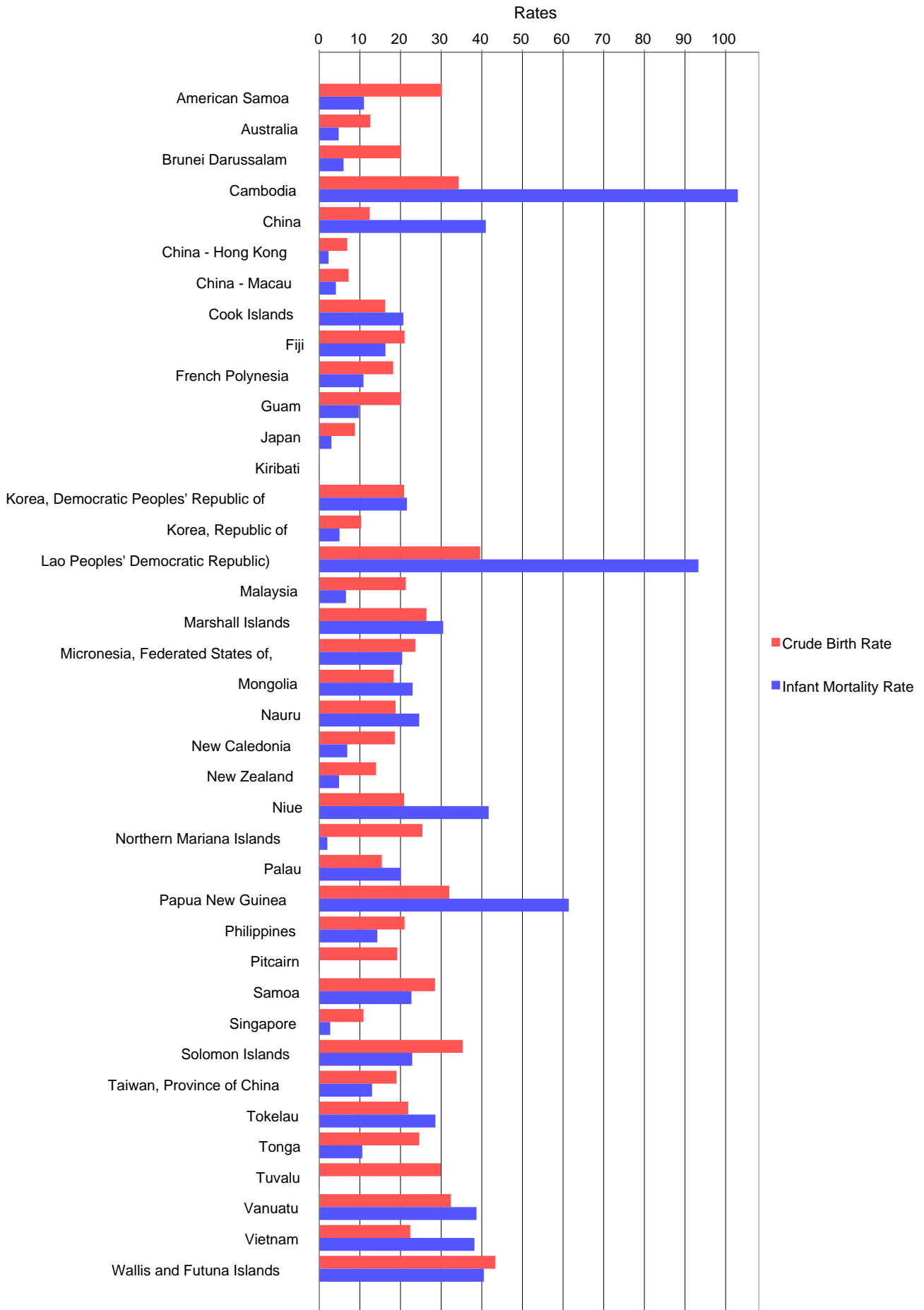
Chart 2: Annual births



Indicates requirement for carrier screening during pregnancy. The annual number of people marrying (not shown) is the indicator for pre-marital or pre-pregnancy screening.

<i>Country</i>	<i>Annual Births</i>
American Samoa	1,751
Australia	250,399
Brunei Darussalam	7,070
Cambodia	460,134
China	15,976,160
China - Hong Kong	46,940
China - Macau	3,204
Cook Islands	291
Fiji	16,926
French Polynesia	4,495
Guam	3,312
Japan	1,123,311
Kiribati	0
Korea, Democratic Peoples' Republic of	495,371
Korea, Republic of	493,627
Lao Peoples' Democratic Republic)	217,800
Malaysia	533,522
Marshall Islands	1,504
Micronesia, Federated States of,	2,844
Mongolia	45,823
Nauru	225
New Caledonia	4,092
New Zealand	56,126
Niue	41
Northern Mariana Islands	1,930
Palau	308
Papua New Guinea	174,784
Philippines	1,702,701
Pitcairn	1
Samoa	4,873
Singapore	45,616
Solomon Islands	15,178
Taiwan, Province of China	407,797
Tokelau	21
Tonga	2,484
Tuvalu	328
Vanuatu	5,637
Vietnam	1,807,007
Wallis and Futuna Islands	606
WHO Western Pacific Region total births	23,914,239

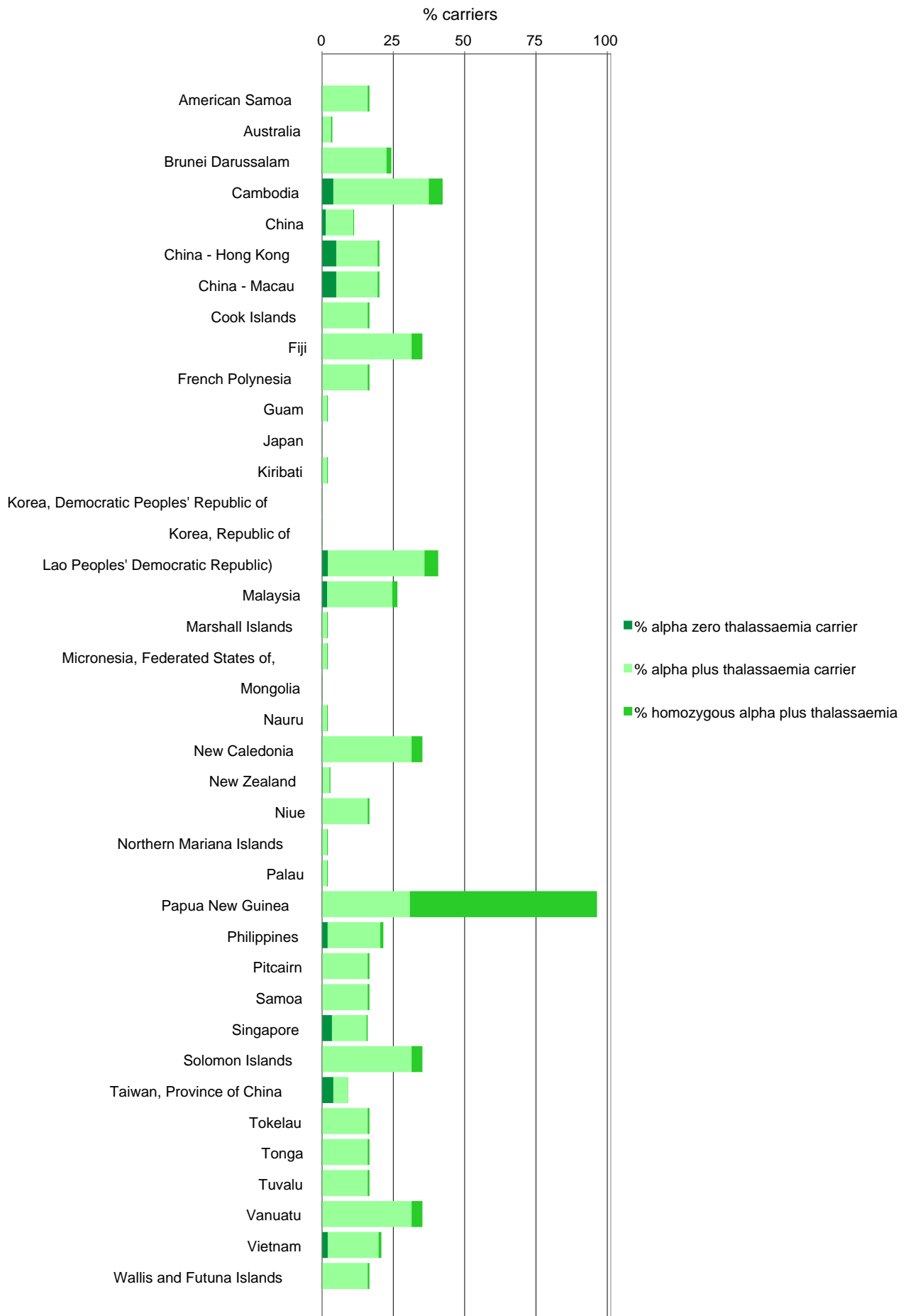
Chart 3: Crude birth rate and infant mortality rate



Crude birth rate (CBR) = live births per 1000 population per year; infant mortality rate (IMR) = deaths under 1 year, per 1,000 live births.

<i>Country</i>	<i>Crude Birth Rate</i>	<i>Infant Mortality Rate</i>
American Samoa	30.2	11
Australia	12.6	4.8
Brunei Darussalam	20.2	6
Cambodia	34.3	103
China	12.4	41
China - Hong Kong	6.9	2.3
China - Macau	7.2	4.1
Cook Islands	16.2	20.7
Fiji	21	16.3
French Polynesia	18.2	10.9
Guam	20.2	9.8
Japan	8.8	3
Kiribati	0	0
Korea, Democratic Peoples' Republic of	20.9	21.6
Korea, Republic of	10.3	5
Lao Peoples' Democratic Republic)	39.6	93.3
Malaysia	21.3	6.6
Marshall Islands	26.4	30.5
Micronesia, Federated States of,	23.7	20.4
Mongolia	18.3	23
Nauru	18.8	24.6
New Caledonia	18.6	6.9
New Zealand	14	4.9
Niue	20.9	41.7
Northern Mariana Islands	25.4	2
Palau	15.4	20
Papua New Guinea	32	61.4
Philippines	21	14.3
Pitcairn	19.2	0
Samoa	28.5	22.7
Singapore	10.9	2.7
Solomon Islands	35.3	22.9
Taiwan, Province of China	19	13
Tokelau	21.9	28.6
Tonga	24.6	10.6
Tuvalu	29.9	0
Vanuatu	32.4	38.7
Vietnam	22.4	38.2
Wallis and Futuna Islands	43.3	40.5
WHO Western Pacific Region aggregate rates	13	35

Chart 4: Per cent of pregnant women carrying alpha globin gene variants, by variant

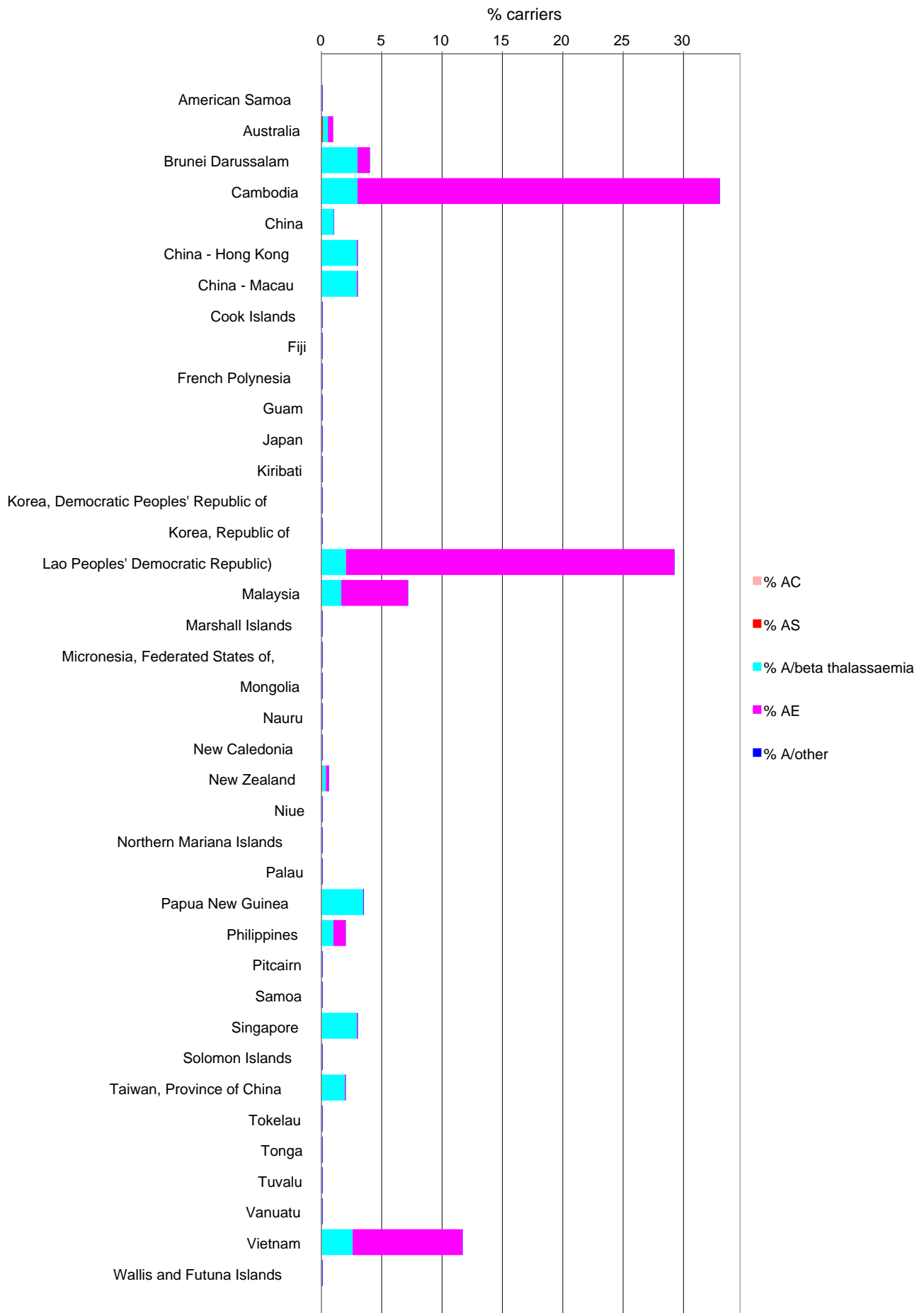


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Data is for deletional alpha globin gene variants. Homozygous alpha plus thalassaemia is included as it is common and harmless.

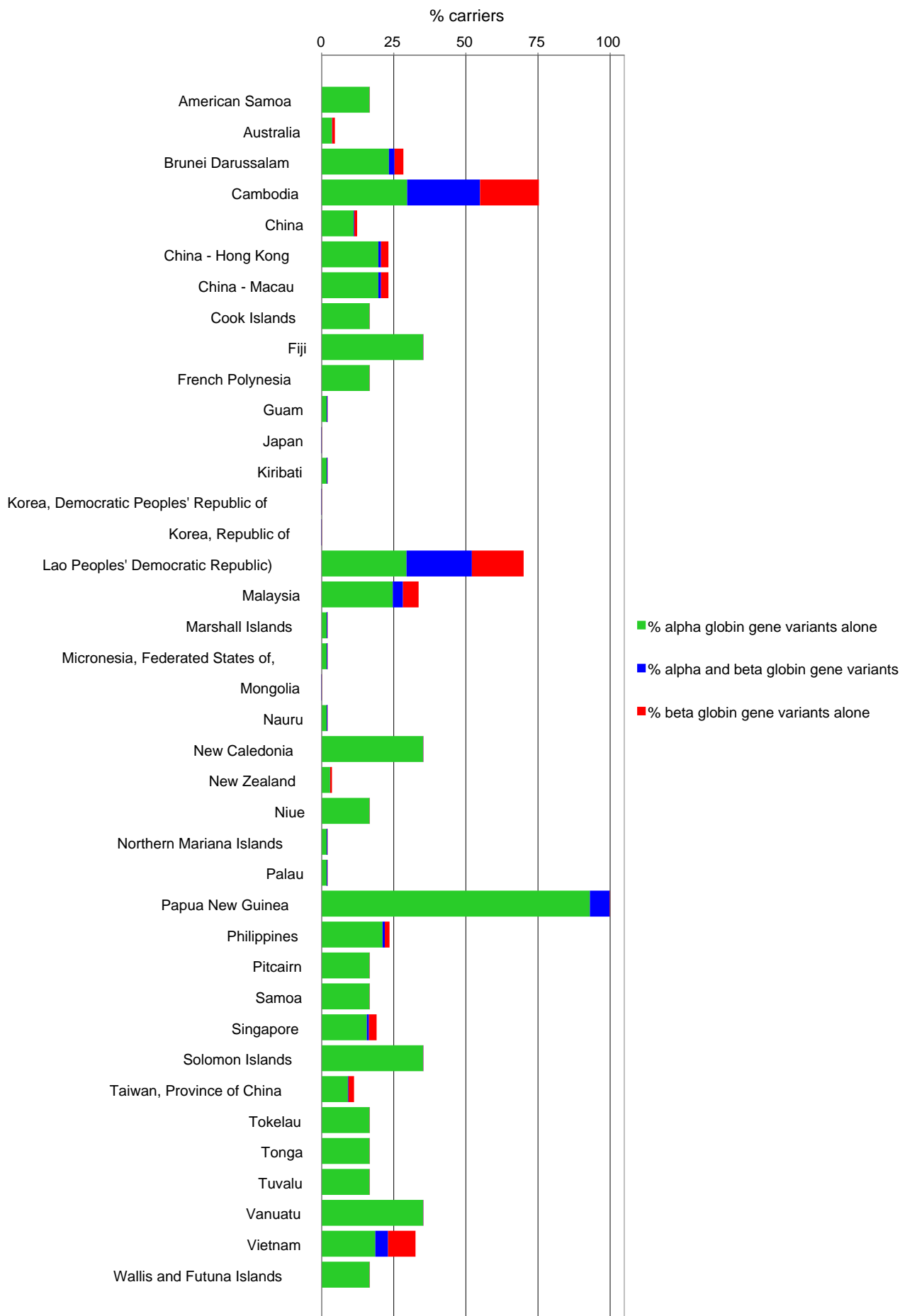
Country	% alpha zero thalassaemia carrier	% alpha plus thalassaemia carrier	% homozygous alpha plus thalassaemia
American Samoa	0	16	0.64
Australia	0.241	2.901	0.488
Brunei Darussalam	0	22.62	1.69
Cambodia	4	33.44	4.84
China	1.383	9.609	0.26
China - Hong Kong	5	14.483	0.656
China - Macau	5	14.483	0.656
Cook Islands	0	16	0.64
Fiji	0	31.395	3.802
French Polynesia	0	16	0.64
Guam	0	1.98	0.01
Japan	0	0	0
Kiribati	0	1.98	0.01
Korea, Democratic Peoples' Republic of	0	0	0
Korea, Republic of	0	0	0
Lao Peoples' Democratic Republic)	2.04	33.871	4.84
Malaysia	1.845	22.817	1.769
Marshall Islands	0	1.98	0.01
Micronesia, Federated States of,	0	1.98	0.01
Mongolia	0	0	0
Nauru	0	1.98	0.01
New Caledonia	0	31.395	3.802
New Zealand	0.207	2.411	0.337
Niue	0	16	0.64
Northern Mariana Islands	0	1.98	0.01
Palau	0	1.98	0.01
Papua New Guinea	0	30.78	65.61
Philippines	2	18.429	1.082
Pitcairn	0	16	0.64
Samoa	0	16	0.64
Singapore	3.5	12.098	0.436
Solomon Islands	0	31.395	3.802
Taiwan, Province of China	4	5.146	0.073
Tokelau	0	16	0.64
Tonga	0	16	0.64
Tuvalu	0	16	0.64
Vanuatu	0	31.395	3.802
Vietnam	2.028	17.797	1
Wallis and Futuna Islands	0	16	0.64
WHO Western Pacific Region aggregate carrier rates	1.444	11.012	0.999

Chart 5: Per cent of pregnant women carrying beta globin gene variants, by variant



Country	% AC	% AS	% A/beta thalassaemia	% AE	% A/other
American Samoa	0	0	0.075	0	0.03
Australia	0.008	0.114	0.426	0.434	0.006
Brunei Darussalam	0	0	3	1	0.03
Cambodia	0	0	3	30	0.03
China	0	0	1.012	0.021	0.03
China - Hong Kong	0	0	3	0	0.03
China - Macau	0	0	3	0	0.03
Cook Islands	0	0	0.075	0	0.03
Fiji	0	0	0.075	0	0.03
French Polynesia	0	0	0.075	0	0.03
Guam	0	0	0.075	0	0.03
Japan	0	0	0.075	0	0.03
Kiribati	0	0	0.075	0	0.03
Korea, Democratic Peoples' Republic of	0	0	0.075	0	0.03
Korea, Republic of	0	0	0.075	0	0.03
Lao Peoples' Democratic Republic)	0	0	2.04	27.2	0.03
Malaysia	0	0	1.658	5.506	0.03
Marshall Islands	0	0	0.075	0	0.03
Micronesia, Federated States of,	0	0	0.075	0	0.03
Mongolia	0	0	0.075	0	0.03
Nauru	0	0	0.075	0	0.03
New Caledonia	0	0	0.075	0	0.03
New Zealand	0.006	0.08	0.293	0.227	0.03
Niue	0	0	0.075	0	0.03
Northern Mariana Islands	0	0	0.075	0	0.03
Palau	0	0	0.075	0	0.03
Papua New Guinea	0	0	3.5	0	0.03
Philippines	0	0	1	1	0.03
Pitcairn	0	0	0.075	0	0.03
Samoa	0	0	0.075	0	0.03
Singapore	0	0	3	0	0.03
Solomon Islands	0	0	0.075	0	0.03
Taiwan, Province of China	0	0	2	0	0.03
Tokelau	0	0	0.075	0	0.03
Tonga	0	0	0.075	0	0.03
Tuvalu	0	0	0.075	0	0.03
Vanuatu	0	0	0.075	0	0.03
Vietnam	0	0	2.596	9.094	0.03
Wallis and Futuna Islands	0	0	0.075	0	0.03
WHO Western Pacific Region aggregate carrier rates	0	0.001	1.141	1.726	0.03

Chart 6: Per cent of pregnant women carrying any haemoglobin gene variant

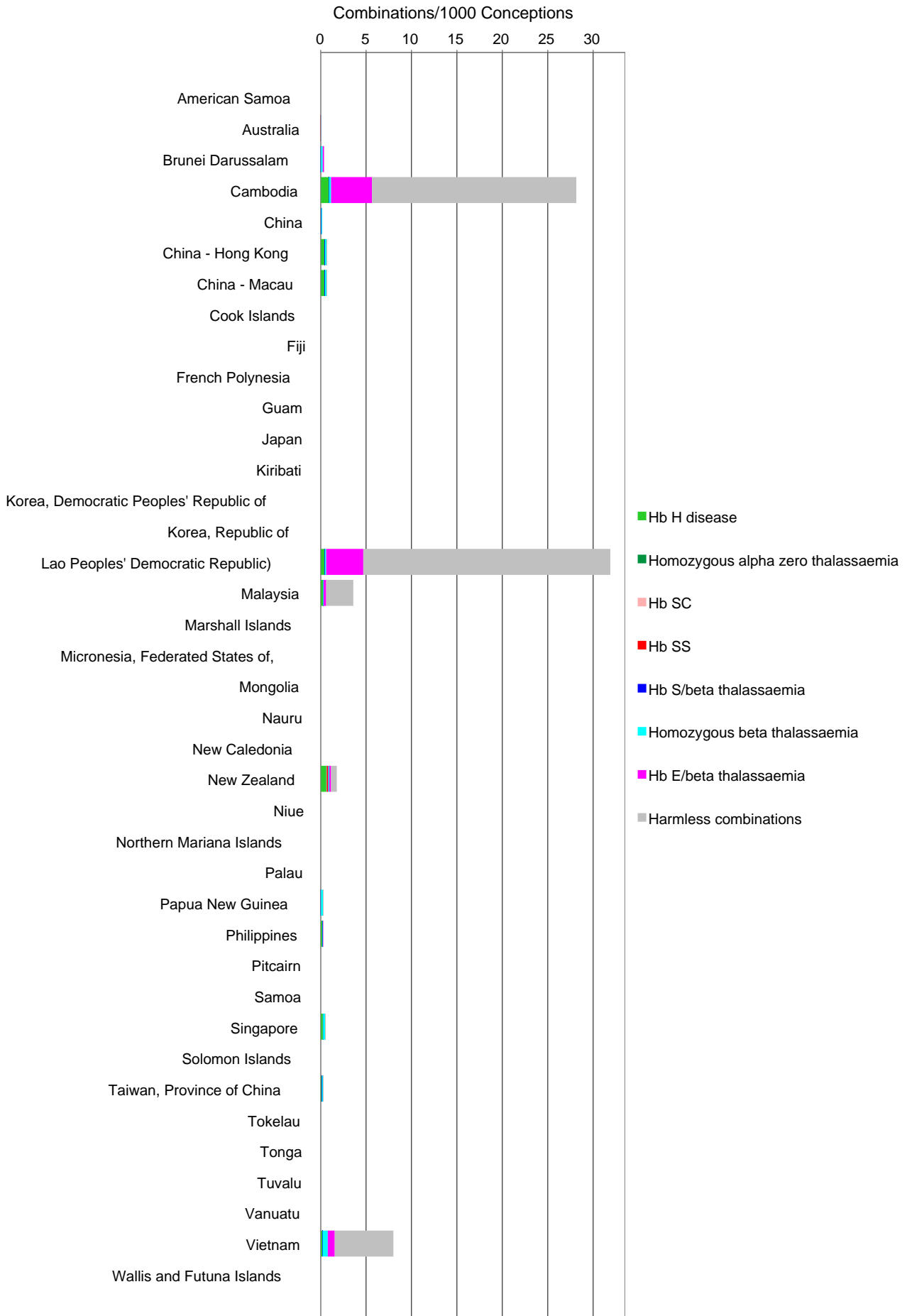


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Alpha and beta globin gene variants are inherited independently and do not interact to cause disease: many people carry both alpha and beta variants.

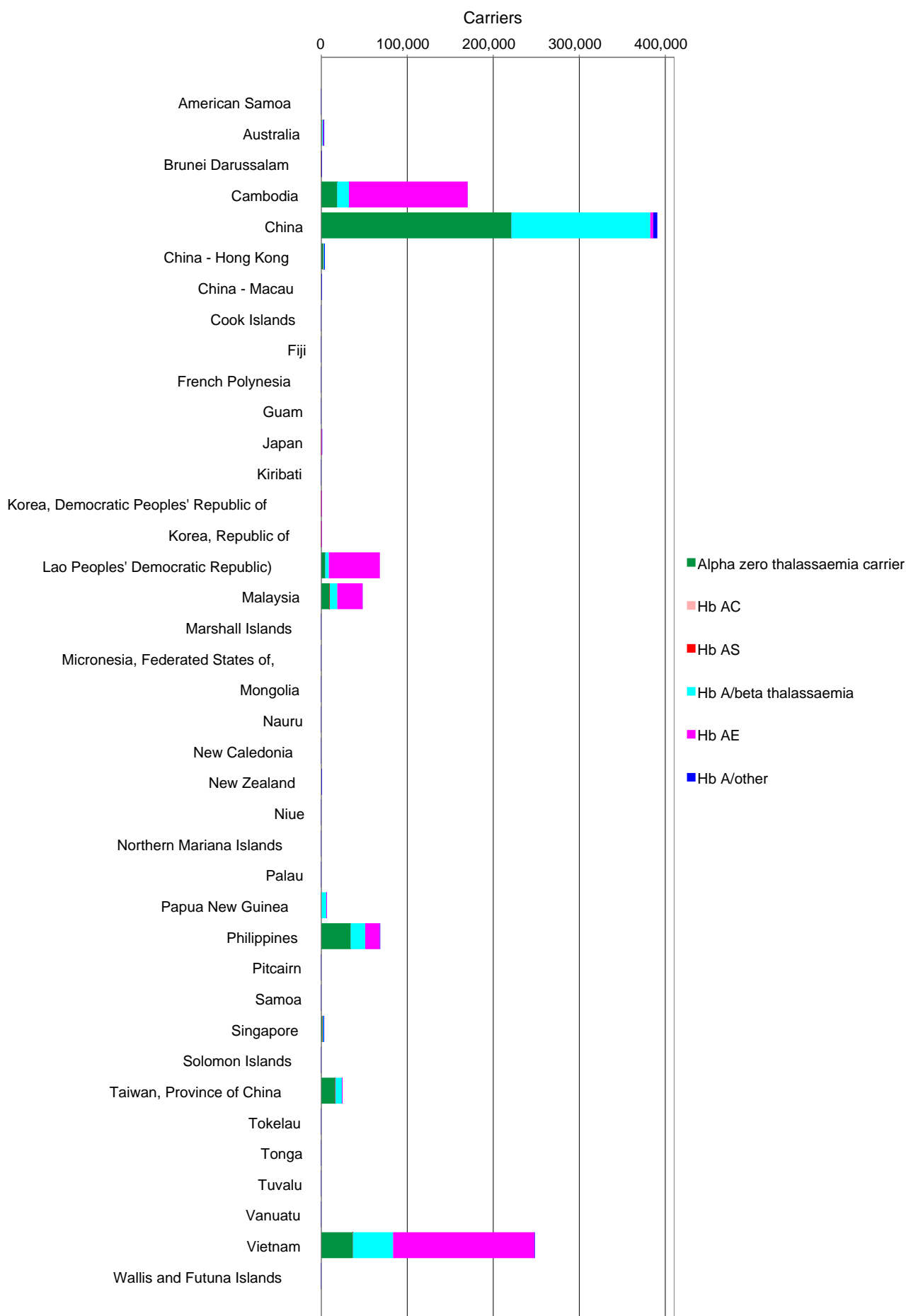
<i>Country</i>	<i>% carriers of alpha globin gene variants alone</i>	<i>% carriers of both alpha and beta globin gene variants</i>	<i>% carriers of beta globin gene variants alone</i>	<i>Total % carriers</i>
American Samoa	16.623	0.035	0.088	16.745
Australia	3.597	0.067	0.954	4.618
Brunei Darussalam	23.33	1.959	3.05	28.34
Cambodia	29.636	25.288	20.386	75.31
China	11.147	0.21	0.958	12.315
China - Hong Kong	19.68	0.917	2.571	23.169
China - Macau	19.68	0.917	2.571	23.169
Cook Islands	16.623	0.035	0.088	16.745
Fiji	35.161	0.074	0.068	35.302
French Polynesia	16.623	0.035	0.088	16.745
Guam	1.988	0.004	0.103	2.095
Japan	0	0	0.105	0.105
Kiribati	1.988	0.004	0.103	2.095
Korea, Democratic Peoples' Republic of	0	0	0.105	0.105
Korea, Republic of	0	0	0.105	0.105
Lao Peoples' Democratic Republic)	29.42	22.662	17.939	70.021
Malaysia	24.662	3.537	5.425	33.624
Marshall Islands	1.988	0.004	0.103	2.095
Micronesia, Federated States of,	1.988	0.004	0.103	2.095
Mongolia	0	0	0.105	0.105
Nauru	1.988	0.004	0.103	2.095
New Caledonia	35.161	0.074	0.068	35.302
New Zealand	2.937	0.035	0.619	3.591
Niue	16.623	0.035	0.088	16.745
Northern Mariana Islands	1.988	0.004	0.103	2.095
Palau	1.988	0.004	0.103	2.095
Papua New Guinea	92.987	6.805	0.127	99.92
Philippines	21.114	0.792	1.634	23.54
Pitcairn	16.623	0.035	0.088	16.745
Samoa	16.623	0.035	0.088	16.745
Singapore	15.654	0.76	2.65	19.063
Solomon Islands	35.161	0.074	0.068	35.302
Taiwan, Province of China	9.113	0.212	1.924	11.249
Tokelau	16.623	0.035	0.088	16.745
Tonga	16.623	0.035	0.088	16.745
Tuvalu	16.623	0.035	0.088	16.745
Vanuatu	35.161	0.074	0.068	35.302
Vietnam	18.622	4.406	9.517	32.545
Wallis and Futuna Islands	16.623	0.035	0.088	16.745
WHO Western Pacific Region aggregate carrier rates	12.776	1.36	2.218	16.354

Chart 7: Conceptions/1000 with combinations of significant variants



Country	Hb H disease	Homozygous alpha zero thalassaemia	Hb SC	Hb SS	Hb S/beta thalassaemia	Homozygous beta thalassaemia	Hb E/beta thalassaemia	Harmless combinations	Total affected conceptions	Total conceptions
American Samoa	0	0	0	0	0	0	0	0	0	0
Australia	0	0	0	0.001	0.006	0.047	0.015	0.041	0.068	0.109
Brunei Darussalam	0	0	0	0	0	0.225	0.15	0.025	0.375	0.4
Cambodia	0.88	0.04	0	0	0	0.225	4.5	22.5	5.645	28.145
China	0.071	0.005	0	0	0	0.094	0.008	0	0.177	0.177
China - Hong Kong	0.405	0.062	0	0	0	0.225	0	0	0.692	0.693
China - Macau	0.405	0.062	0	0	0	0.225	0	0	0.692	0.693
Cook Islands	0	0	0	0	0	0	0	0	0	0
Fiji	0	0	0	0	0	0	0	0	0	0
French Polynesia	0	0	0	0	0	0	0	0	0	0
Guam	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0.001	0	0	0.001	0.001
Kiribati	0	0	0	0	0	0	0	0	0	0
Korea, Democratic Peoples' Republic of	0	0	0	0	0	0	0	0	0	0
Korea, Republic of	0	0	0	0	0	0	0	0	0	0
Lao Peoples' Democratic Republic)	0.449	0.01	0	0	0	0.153	4.08	27.2	4.692	31.892
Malaysia	0.245	0.009	0	0	0	0.069	0.289	2.981	0.612	3.592
Marshall Islands	0	0	0	0	0	0	0	0	0	0
Micronesia, Federated States of,	0	0	0	0	0	0	0	0	0	0
Mongolia	0	0	0	0	0	0	0	0	0	0
Nauru	0	0	0	0	0	0	0	0	0	0
New Caledonia	0	0	0	0	0	0	0	0	0	0
New Zealand	0.599	0.054	0.023	0.156	0.027	0.093	0.199	0.624	1.151	1.775
Niue	0	0	0	0	0	0	0	0	0	0
Northern Mariana Islands	0	0	0	0	0	0	0	0	0	0
Palau	0	0	0	0	0	0	0	0	0	0
Papua New Guinea	0	0	0	0	0	0.306	0	0	0.306	0.306
Philippines	0.208	0.01	0	0	0	0.025	0.05	0.025	0.293	0.318
Pitcairn	0	0	0	0	0	0	0	0	0	0
Samoa	0	0	0	0	0	0	0	0	0	0
Singapore	0.231	0.031	0	0	0	0.225	0	0	0.487	0.487
Solomon Islands	0	0	0	0	0	0	0	0	0	0
Taiwan, Province of China	0.108	0.04	0	0	0	0.1	0	0	0.248	0.248
Tokelau	0	0	0	0	0	0	0	0	0	0
Tonga	0	0	0	0	0	0	0	0	0	0
Tuvalu	0	0	0	0	0	0	0	0	0	0
Vanuatu	0	0	0	0	0	0	0	0	0	0
Vietnam	0.203	0.01	0	0	0	0.567	0.772	6.455	1.552	8.006
Wallis and Futuna Islands	0	0	0	0	0	0	0	0	0	0
WHO Western Pacific Region aggregate rates	0.108	0.007	0	0	0	0.12	0.198	1.238	0.433	1.671

Chart 8: Annual pregnant carriers of significant variants

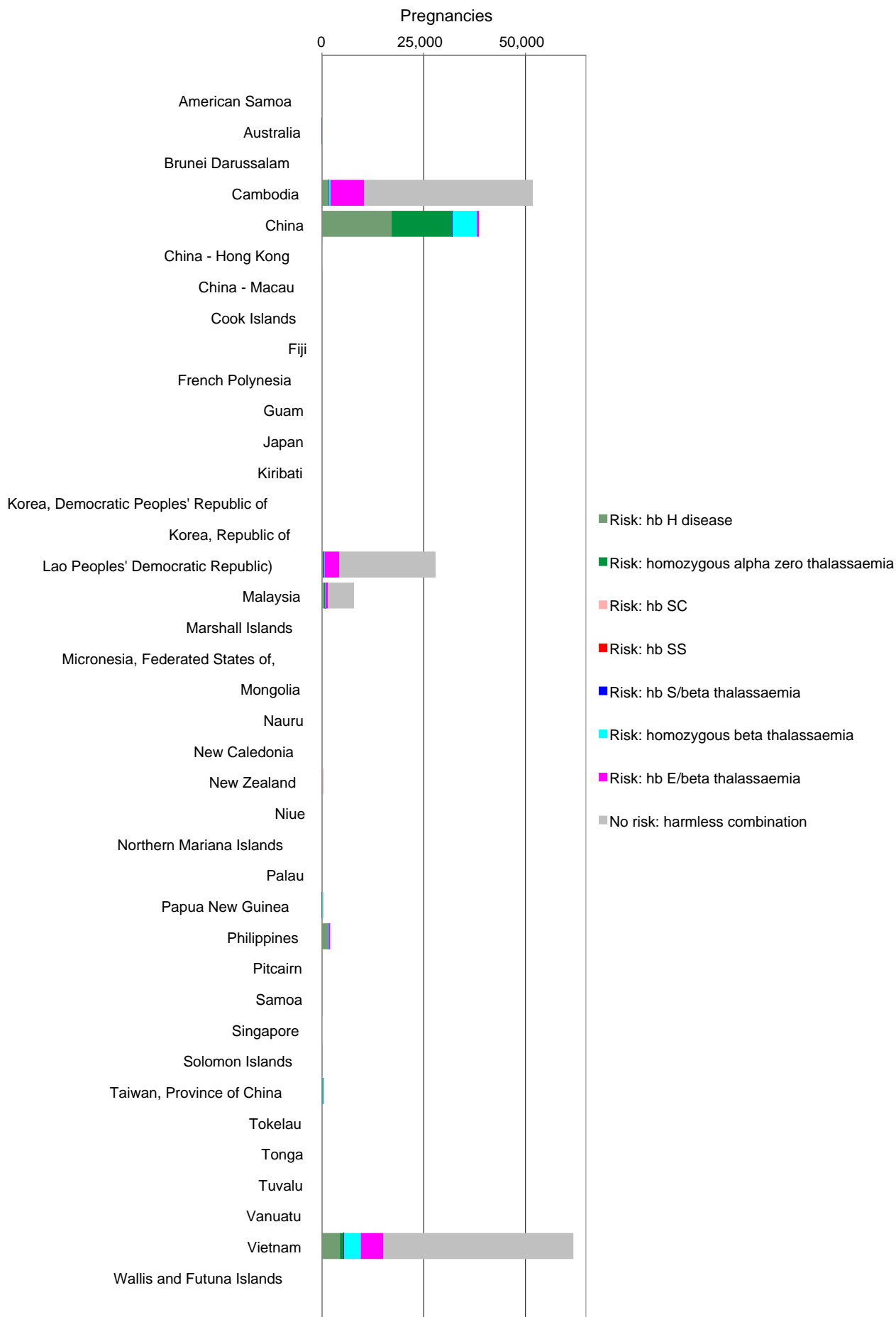


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Indicates requirement for information for carriers, and the offer of partner testing. Also indicates annual carriers detectable by neonatal screening.

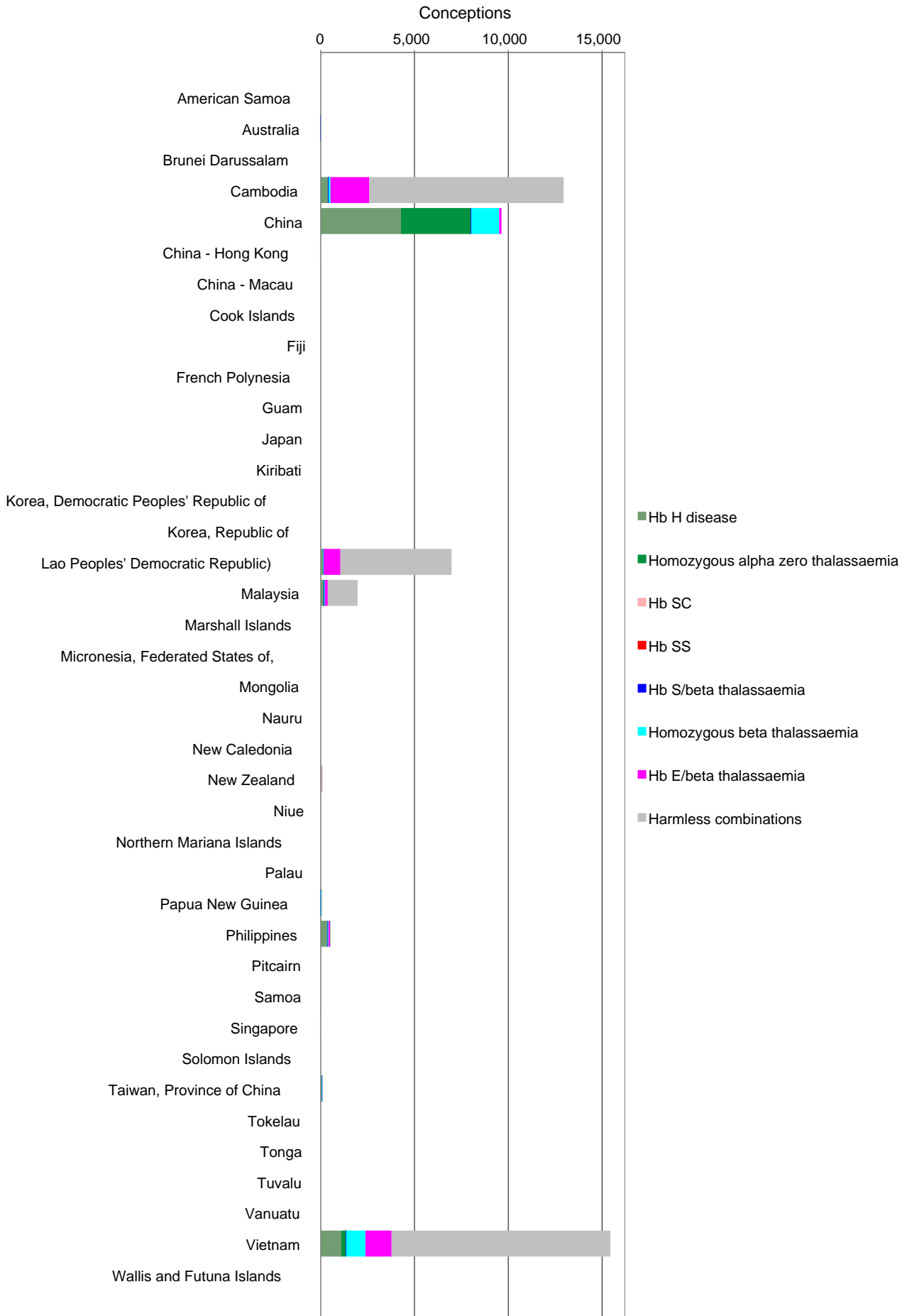
Country	Alpha zero thalassaemia carrier	Hb AC	Hb AS	Beta thalassaemia carrier	Hb AE	Hb A/other	Total carriers
American Samoa	0	0	0	1	0	0	1
Australia	604	20	284	1,066	1,086	14	3,074
Brunei Darussalam	0	0	0	212	70	2	284
Cambodia	18,405	0	0	13,804	138,040	138	170,387
China	220,899	0	0	161,637	3,363	4,792	390,691
China - Hong Kong	2,347	0	0	1,408	0	14	3,769
China - Macau	160	0	0	96	0	0	256
Cook Islands	0	0	0	0	0	0	0
Fiji	0	0	0	12	0	5	17
French Polynesia	0	0	0	3	0	1	4
Guam	0	0	0	2	0	0	2
Japan	0	0	0	842	0	336	1,178
Kiribati	0	0	0	0	0	0	0
Korea, Democratic Peoples' Republic of	0	0	0	371	0	148	519
Korea, Republic of	0	0	0	370	0	148	518
Lao Peoples' Democratic Republic)	4,443	0	0	4,443	59,241	65	68,192
Malaysia	9,843	0	0	8,845	29,374	160	48,222
Marshall Islands	0	0	0	1	0	0	1
Micronesia, Federated States of,	0	0	0	2	0	0	2
Mongolia	0	0	0	34	0	13	47
Nauru	0	0	0	0	0	0	0
New Caledonia	0	0	0	3	0	1	4
New Zealand	116	3	44	164	127	16	470
Niue	0	0	0	0	0	0	0
Northern Mariana Islands	0	0	0	1	0	0	1
Palau	0	0	0	0	0	0	0
Papua New Guinea	0	0	0	6,117	0	52	6,169
Philippines	34,054	0	0	17,027	17,027	510	68,618
Pitcairn	0	0	0	0	0	0	0
Samoa	0	0	0	3	0	1	4
Singapore	1,596	0	0	1,368	0	13	2,977
Solomon Islands	0	0	0	11	0	4	15
Taiwan, Province of China	16,311	0	0	8,155	0	122	24,588
Tokelau	0	0	0	0	0	0	0
Tonga	0	0	0	1	0	0	1
Tuvalu	0	0	0	0	0	0	0
Vanuatu	0	0	0	4	0	1	5
Vietnam	36,649	0	0	46,903	164,327	542	248,421
Wallis and Futuna Islands	0	0	0	0	0	0	0
WHO Western Pacific Region total pregnant carriers	345,427	23	328	272,906	412,655	7,098	1,038,437

Chart 9: Annual pregnancies where both parents carry a significant variant



Country	Risk: hb H disease	Risk: homozygous alpha zero thalassaemia	Risk: hb SC	Risk: hb SS	Risk: hb S/beta thalassaemia	Risk: homozygous beta thalassaemia	Risk: hb E/beta thalassaemia	No risk: harmless combination	Total at-risk pregnancies	Total pregnancies requiring risk assessment
American Samoa	0	0	0	0	0	0	0	0	0	0
Australia	0	0	0	0	4	44	12	40	60	100
Brunei Darussalam	0	0	0	0	0	4	4	0	8	8
Cambodia	1,616	72	0	0	0	412	8,280	41,412	10,380	51,792
China	17,124	14,968	0	0	0	5,972	500	20	38,564	38,584
China - Hong Kong	76	8	0	0	0	40	0	0	124	124
China - Macau	4	0	0	0	0	0	0	0	4	4
Cook Islands	0	0	0	0	0	0	0	0	0	0
Fiji	0	0	0	0	0	0	0	0	0	0
French Polynesia	0	0	0	0	0	0	0	0	0	0
Guam	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0	0	0
Kiribati	0	0	0	0	0	0	0	0	0	0
Korea, Democratic Peoples' Republic of	0	0	0	0	0	0	0	0	0	0
Korea, Republic of	0	0	0	0	0	0	0	0	0	0
Lao Peoples' Democratic Republic)	388	140	0	0	0	132	3,552	23,696	4,212	27,908
Malaysia	520	232	0	0	0	144	616	6,360	1,512	7,872
Marshall Islands	0	0	0	0	0	0	0	0	0	0
Micronesia, Federated States of,	0	0	0	0	0	0	0	0	0	0
Mongolia	0	0	0	0	0	0	0	0	0	0
Nauru	0	0	0	0	0	0	0	0	0	0
New Caledonia	0	0	0	0	0	0	0	0	0	0
New Zealand	132	12	4	32	4	20	44	140	248	388
Niue	0	0	0	0	0	0	0	0	0	0
Northern Mariana Islands	0	0	0	0	0	0	0	0	0	0
Palau	0	0	0	0	0	0	0	0	0	0
Papua New Guinea	0	0	0	0	0	212	0	0	212	212
Philippines	1,416	68	0	0	0	168	340	168	1,992	2,160
Pitcairn	0	0	0	0	0	0	0	0	0	0
Samoa	0	0	0	0	0	0	0	0	0	0
Singapore	40	4	0	0	0	40	0	0	84	84
Solomon Islands	0	0	0	0	0	0	0	0	0	0
Taiwan, Province of China	176	64	0	0	0	160	0	0	400	400
Tokelau	0	0	0	0	0	0	0	0	0	0
Tonga	0	0	0	0	0	0	0	0	0	0
Tuvalu	0	0	0	0	0	0	0	0	0	0
Vanuatu	0	0	0	0	0	0	0	0	0	0
Vietnam	4,408	1,032	0	0	0	4,092	5,580	46,652	15,112	61,764
Wallis and Futuna Islands	0	0	0	0	0	0	0	0	0	0
WHO Western Pacific Region total pregnancies	25,900	16,600	4	32	8	11,440	18,928	118,488	72,912	191,400

Chart 10: Annual conceptions with combinations of significant gene variants



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Indicates (potential) annual affected births, and annual increase in requirements for patient care. Baseline for assessing effects of prevention.

Country	Hb H disease	Homozygous alpha zero thalassaemia	Hb SC	Hb SS	Hb S/beta thalassaemia	Homozygous beta thalassaemia	Hb E/beta thalassaemia	Harmless combinations	Total affected conceptions	Total conceptions with combinations
American Samoa	0	0	0	0	0	0	0	0	0	0
Australia	0	0	0	0	1	11	3	10	15	25
Brunei Darussalam	0	0	0	0	0	1	1	0	2	2
Cambodia	404	18	0	0	0	103	2,070	10,353	2,595	12,948
China	4,281	3,742	0	0	0	1,493	125	5	9,641	9,646
China - Hong Kong	19	2	0	0	0	10	0	0	31	31
China - Macau	1	0	0	0	0	0	0	0	1	1
Cook Islands	0	0	0	0	0	0	0	0	0	0
Fiji	0	0	0	0	0	0	0	0	0	0
French Polynesia	0	0	0	0	0	0	0	0	0	0
Guam	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0	0	0
Kiribati	0	0	0	0	0	0	0	0	0	0
Korea, Democratic Peoples' Republic of	0	0	0	0	0	0	0	0	0	0
Korea, Republic of	0	0	0	0	0	0	0	0	0	0
Lao Peoples' Democratic Republic)	97	35	0	0	0	33	888	5,924	1,053	6,977
Malaysia	130	58	0	0	0	36	154	1,590	378	1,968
Marshall Islands	0	0	0	0	0	0	0	0	0	0
Micronesia, Federated States of,	0	0	0	0	0	0	0	0	0	0
Mongolia	0	0	0	0	0	0	0	0	0	0
Nauru	0	0	0	0	0	0	0	0	0	0
New Caledonia	0	0	0	0	0	0	0	0	0	0
New Zealand	33	3	1	8	1	5	11	35	62	97
Niue	0	0	0	0	0	0	0	0	0	0
Northern Mariana Islands	0	0	0	0	0	0	0	0	0	0
Palau	0	0	0	0	0	0	0	0	0	0
Papua New Guinea	0	0	0	0	0	53	0	0	53	53
Philippines	354	17	0	0	0	42	85	42	498	540
Pitcairn	0	0	0	0	0	0	0	0	0	0
Samoa	0	0	0	0	0	0	0	0	0	0
Singapore	10	1	0	0	0	10	0	0	21	21
Solomon Islands	0	0	0	0	0	0	0	0	0	0
Taiwan, Province of China	44	16	0	0	0	40	0	0	100	100
Tokelau	0	0	0	0	0	0	0	0	0	0
Tonga	0	0	0	0	0	0	0	0	0	0
Tuvalu	0	0	0	0	0	0	0	0	0	0
Vanuatu	0	0	0	0	0	0	0	0	0	0
Vietnam	1,102	258	0	0	0	1,023	1,395	11,663	3,778	15,441
Wallis and Futuna Islands	0	0	0	0	0	0	0	0	0	0
WHO Western Pacific Region total pregnancies	6,475	4,150	1	8	2	2,860	4,732	29,622	18,228	47,850