

## On the Average I: Physicians per Capita

Data gymnastics, exercise #1: In Figure 1 (attached Excel file 1 Phy/Cap Rdc'd Cols) you have data for 137 countries: Column 1 names the country. Column 2 gives you an estimate of the number of physicians in that country. Column 3 gives you the estimate of the population for that country. Question: What is the average rate of physicians per capita?

As a problem in arithmetic, that's easy: For each nation I construct the ratio of doctors to people. That gives me a new number describing each nation, computed and shown in columns 4 and 5. So, for the United States (in 1975), row 130, the data show 348-thousand doctors and 213-million people, which works out to .001629 doctors per person, 1.6 doctors per thousand people. I repeat that computation for each row, getting a number that describes each nation. And then I compute the average: The average of these national statistics is .000681 physicians per capita. That's 0.7 physicians per thousand, approximately two thirds of a doctor for each one thousand people.

That's it — or is it? It's good to do things, even easy things, two or more ways, just to be sure that everything" is right, just to be sure that everything is clear. So looking at these data for a second time, surely there's an easier way than the one I used above: If I want the number of physicians per person in the world (that part of the world for which I have data), then why not just add up the number of doctors, add up the number of people, and then divide the number of doctors by the number of people? Why not?

Adding-up the number of doctors: The sum is approximately three million doctors (reported as 2,622,088 doctors at the bottom of Column 2). Adding-up the number of people: The sum is approximately three billion, (reported as 3,028,196,000 noted at the bottom of Column 3). So, dividing the number of doctors by the number of people, the answer is

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.000866 doctors per capita, which is approximately .001 doctors per capita or, approximately 0.9 doctors per thousand people.

And, now, as you see, I have a problem: The first time through, I got 0.7 doctors per thousand people. The second time through I got 0.9 doctors per thousand people. And, of course, 0.9 just is not the same answer as 0.7. If you accepted what I did, and found both procedures straight forward (and numerically correct), then why are the two answers different?

Should I worry about such a thing? I could get out by talking quickly, flashing a few extra digits and then concluding that I have two estimates showing between one-half and one doctor per thousand people, across the world in 1975. Or I could dismiss the whole thing, saying that the two numbers are almost the same. But that's just whistling in the dark and hoping no one will notice that I'm in trouble. If you accepted both arguments and if both arguments were correct, then the numbers should be exactly the same. Something is wrong.

I could take another out: Surely all of these data are rough approximations at best. Possibly some of them are as much bravado as fact establishing a nation's standing in the pecking order of nations — my country is better than yours, when the United Nations compares one nation to another. And the data are suspect: If you do your homework, beginning with one variable checks for each of the two variables, and continue with your one variable check on the column of numbers for doctors per capita, then you will have some serious questions about this stuff. But that's just another verbal dodge: confusing my reader by arguing that fuzzy data allow fuzzy conclusions, even for something as simple as the average. That's a dodge: Whether or not I believe the detailed numbers, my problem is that I have what appear to be two different estimates of doctors per person both based on the same numbers — that's not acceptable because it shows that something is wrong — it is a loose thread in my web of credibility and I've got to fix it.

Well, there's another possibility here that may rescue me from confusion: There is an awful lot of estimation going on in these numbers,

some of them are large numbers, some of them are small — and that's the kind of thing that leads computers into rounding error. That's a possibility to be considered. It's not the real problem here but it leads to an important suggestion: We've got two confusing things going on here: We've got data that we're trying to understand and, as it turns out, we've got a method that we've got to work on before the method itself is understand. And, for the moment, both of them are confusing. So, let's simplify the problem, simplify the data, in order to focus on the complexity of the method.



<b>Doctors/Person =</b>		<b>0.001308366</b>		
<b>Doctors/Thousand Persons =</b>		<b>1.308</b>	<b>Compare as Doctors per 1,000 People</b>	

Figure \_ (Excel file Phy/Cap Rdcd Cols 18 Rows) shows the same kind of data, restricted to North American and Caribbean nations. The problem is still there: The two different “averages” remain unequal, shown in the same locations as Figure 1. But there’s no reason to stop here: For the moment, I don’t need a set of nations that represents anything, my immediate problem is to understand the method — then and only then will I try to use it. So simplifying, here is a “sample” of the U.S. and Mexico. Let’s take a look at the data for these two.

Country	Doctors '75	Population '75	Doctors Per Person	Doctors Per 1,000 People
Mexico	31,556	59,204,000	0.000533	0.533
USA	348,484	213,925,000	0.001629	1.629
<b>Sums (for Doctors &amp; Population)</b>			<b>Averages:</b>	
	380,041	273,129,000	0.001081	1.081
				925 people per doctor
<b>Doctors/Person =</b>		<b>0.00139143</b>		
<b>Doctors/Thousand Persons =</b>		<b>1.391</b>		
		<b>719 people per doctor</b>		

Derived from: World Handbook of Political and Social Indicators, Third Edition, by Charles F. Jones and David A. Jodice, Yale University Press, New Haven and London, 1983

The first point is that the inequality is still there: With only two countries left in the table the two different estimates of the “average” are still different, 1.081 versus 1.391. And there is nothing much left that can be dismissed as detail or “complication”. Whatever is going on, whatever it is that makes these two computations represent different things not just different computations. Do I care about this 20 to 25% discrepancy. You bet: Unless I understand what’s going on here, all I know is that I’ve got a problem and I don’t even know how large it is, or how large it would be in other data — the discrepancy tells me I don’t know what I’m doing — and I’m responsible for that. And if this were not an exercise but the beginning of a research project, then work would stop right here, or should stop, until the principles are understood: If my research required me to estimate how much the ratio of doctors to people had changed in twenty-five years, if my research needed to ask whether socialized medical systems were different from others, if my inquiry were to ask how physicians per capita was related to nations wealth and, perhaps, how physicians per capita was inversely related to other government expenditures — whatever it is that I need to know for research or policy — I’m surely not ready for subtle comparisons among nations when I can’t even zero-in on the first estimate for the first set of data. I need an answer.

The answer, or at least the route to an answer, lies in looking very closely at the unit of analysis: What is it that is described by each of the numbers? So let’s add some units and then carry the units into the arithmetic: Here are the “data”, the basic four numbers with labels.

31,556 doctors	59,204,000 people
348,484 doctors	213,925,000 people

Country	Doctors	Population	Doctors	Doctors
			per Person	per 1,000 People
Mexico	31,556	59,204,000	0.000533	0.533
USA	348,484	213,925,000	0.001629	1.629

When I compute the first ratio, .533 doctors per thousand people, that ratio describes the unit Mexico: It had half a doctor per thousand people. When I compute the second ratio, 1.629 doctors per thousand, the ratio describes the unit United States: At one and one half doctors per thousand people, the United States has approximately three times as many doctors per capita as Mexico. Each of the two numbers measures the attribute of a country. And the average with respect to these two countries is the average of doctors per person *per country*. 1.1 doctors per thousand people is the single number that comes closest to describing these two data points

By contrast, the second computation adds up the numbers of doctors to estimate the number of doctors in the world (in the two country example, it is the “world” comprised of these two countries). It adds up the number of people to estimate the number of people in the world. And then, dividing the number of doctors in the world by the number by the number of people in the world it describes the average number of doctor per person in the world at large — ignoring countries.

At risk of going past clarity to something that is “painfully” clear, the more precise description of these data requires, and uses, two levels of aggregation, each of which corresponds to a unit of analysis. At the first level of aggregation the unit of analysis is the person. It shows the number of doctors *per person*.

One of the two descriptions ascends to a second level of aggregation, the country. Here doctors per person is an attribute of the country which is the unit of analysis. In Mexico, there are .0005 doctors per per-

son, 0.5 doctors per thousand. In the United States, there are 1.6 doctors per thousand. And the average of the two numbers is the doctors per person of an average country.

By contrast, the other computation continues to compute doctors per person assembling one datum (not really an average) that describes the world. It is equally correct to say that in this second analysis the unit of analysis is the person. In the world (the "world" of the United States and Mexico) there are about 1.4 doctors per thousand people.

Aside on homework:

When you try to explain the difference between these two averages there is at least one very sophisticated way of explaining it which is both sophisticated and wrong.

Here's the wrong way:

“The average that adds up the two numbers and divides by two treats both countries equally. But they are not equal. The United States has a larger population than Mexico. So the average computed by adding two numbers and divides by two gives less weight to the average American than it does to the average Mexican. By contrast, summing the populations, summing the doctors and then dividing one sum by the other gives all people equal weight.”

That explanation is wrong. It discusses the weight given to each person in one computation versus the weight given to each person in the other population. And therefore, subtly, it implies that the person is the correct unit of analysis.

That explanation is wrong because it misses the point. Sure enough, we can use weights to convert the data into results that describe one unit of analysis or another unit of analysis. But the important point *is* that unit of analysis. The country as a unit of analysis has an economy, a health care system which includes medical education, an economy of medical care, and a distribution system: The average system delivers 1.1 doctors per thousand people. By contrast, the person as a unit of analysis, shorn of politics, shorn of the wealth of the country in which a person lives, experiences 0.9 doctors per thousand. That's the experience of the average person.

So, back to the data with which I began. What can I say about doctor per person:

UNESCO data for 1975 estimate 2.6 million doctors and 3.0 billion people in the world, leaving a world wide average of .866 doctors per thousand people, less than one doctor per thousand people. But nations are unequal in size and unequal in their ability to deliver these services, so that the average nation-based health system achieves only .681 doctors per thousand — which implies that some of the larger nations have relatively inferior delivery of services, inferior as compared to the average nation.

In this regard it should be noted that data for China are missing from these numbers. With 20% of the world's population excluded from the data, the estimate of the resources available to the average person must be treated with caution. However as China is but one nation among many, the description of estimate of results achieved by the average health care system is not seriously affected by the absence of data for China.

Homework: You will receive an Excel sheet describing, one, the population, and, two, the Gross National Products of nations. First, compute the gross national product *per capita* for each nation and compute the average of the gross national products. Second, add-up the gross national products and add up the populations and compute the product per person. That's the easy part. Now: Write a short essay clearly describing the two results and what each of them means.

I give you a target audience for your essay: I like to try to write for my ten year old niece. What is a ten year old? A ten year old has all the operating mental equipment of an adult, but none of the experience, and a very short attention span. The ten year old is not easily impressed or intimidated — efforts to do so usually just lose the attention of such an audience: You have to get to the point. Your "story" has to connect the numbers and it has to make a point. And you have to make it short.

And also: Be very careful with the units. I've given them to you as they come from the data base I am using: thousands of people and millions of dollars, not people and dollars. Above, I hid my clean up of the data base, not showing you the numbers until after I had put them in terms of people and doctors. I don't mind if you work with data tabulated in thousands and millions, but be very careful about the units on your results: When you report dollars per person, in either of the two ways you will use, make sure you really have dollars per person.

Country	Doctors '75	Total Population	Doctors/Per son	Doctors Per 1,000 People
Afghanistan	656	19,280,000	3.40249E-05	0.034
Angola	384	6,394,000	6.00563E-05	0.060
Argentina	48,687	25,384,000	0.00191800	1.918
Austria	15,702	7,538,000	0.00208300	2.083
Bahamas	161	200,000	0.000800	0.805
Bahrain	177	260,000	0.00068070	0.681
Bangladesh	5,088	73,746,000	6.89936E-05	0.069
Barabados	166	245,000	0.00067750	0.678
Belgium	18,510	9,846,000	0.00187990	1.880
Benin	95	3,074,000	3.09044E-05	0.031
Bolivia	2,581	5,410,000	0.00047700	0.477
Botswana	63	691,000	9.11722E-05	0.091
Brazil	62,656	109,730,000	0.00057100	0.571
Bulgaria	18,773	8,793,000	0.00213490	2.135
Burma	5,561	31,240,000	0.00017800	0.178
Burundi	83	3,765,000	2.20452E-05	0.022
Cameroon	354	6,433,000	5.50288E-05	0.055
Canada	39,104	22,801,000	0.00171500	1.715
Central African Republic	97	1,790,000	5.41899E-05	0.054
Chad	83	3,947,000	2.10286E-05	0.021
Chile	4,419	10,253,000	0.00043090	0.431
Colombia	12,997	25,890,000	0.00050200	0.502
Comoros	21	306,000	6.86275E-05	0.069
Congo	213	1,345,000	0.00015830	0.158
Costa Rica	1,292	1,994,000	0.00064790	0.648
Cuba	8,201	9,481,000	0.00086490	0.865
Cyprus	547	673,000	0.00081270	0.813
Czechoslovakia	35,385	14,793,000	0.00239200	2.392
Denmark	9,896	5,026,000	0.00196890	1.969
Dominican Republic	2,375	5,118,000	0.00046400	0.464
Ecuador	3,517	7,090,000	0.00049600	0.496
Egypt	8,034	37,543,000	0.00021390	0.214
El Salvador	1,117	4,108,000	0.00027190	0.272
Equatorial Guinea	5	313,000	1.59744E-05	0.016
Ethiopia	338	28,134,000	1.20139E-05	0.012
Finland	6,699	4,652,000	0.00144000	1.440
France	77,888	52,913,000	0.00147200	1.472
Gabon	96	521,000	0.00018420	0.184
Germany East	31,308	17,127,000	0.00182790	1.828
Germany West	122,069	61,682,000	0.00197900	1.979
Ghana	938	9,873,000	9.50066E-05	0.095
Greece	18,423	8,930,000	0.00206300	2.063
Grenada	25	100,000	0.000200	0.250
Guatemala	1,207	6,129,000	0.00019690	0.197
Guinea	278	4,416,000	6.29529E-05	0.063
Guyana	237	791,000	0.00029960	0.300
Haiti	396	4,552,000	8.69947E-05	0.087
Honduras	920	3,037,000	0.00030290	0.303

Hong Kong	2,881	4,225,000	0.00068189	0.682
Hungary	21,131	10,534,000	0.00200598	2.006
Iceland	372	216,000	0.00172222	1.722
India	145,946	613,217,000	0.00023800	0.238
Indonesia	8,299	136,044,000	6.10023E-0	0.061
Iran	11,358	32,923,000	0.00034498	0.345
Iraq	4,504	11,067,000	0.00040697	0.407
Ireland	3,773	3,131,000	0.00120502	1.205
Israel	9,144	3,417,000	0.00267603	2.676
Italy	114,228	55,023,000	0.00207600	2.076
Ivory Coast / Cote d'Ivoire	322	4,885,000	6.59161E-0	0.066
Jamaica	570	2,029,000	0.00028092	0.281
Japan	133,344	111,120,000	0.001	1.200
Jordan	745	2,688,000	0.00027715	0.277
Kenya	1,246	13,251,000	9.40306E-0	0.094
Korea South	17,851	34,663,000	0.00051498	0.515
Kuwait	1,089	1,085,000	0.00100368	1.004
Laos	155	3,303,000	4.69270E-0	0.047
Lebanon	2,301	2,869,000	0.00080202	0.802
Lesotho	49	1,148,000	4.26829E-0	0.043
Liberia	142	1,708,000	8.31382E-0	0.083
Libya	2,586	2,255,000	0.00114678	1.147
Luxembourg	368	342,000	0.00107602	1.076
Madagascar	754	8,020,000	9.40150E-0	0.094
Malawi	103	4,909,000	2.09819E-0	0.021
Malaysia	2,007	12,093,000	0.00016590	0.166
Maldives	9	120,000	0.00007	0.075
Mali	142	5,697,000	2.49254E-0	0.025
Malta	382	329,000	0.00116109	1.161
Mauritania	87	1,283,000	6.78098E-0	0.068
Mauritius	346	899,000	0.00038487	0.385
Mexico	31,556	59,204,000	0.00053300	0.533
Mongolia	2,604	1,446,000	0.0018008	1.801
Morocco	1,243	17,504,000	7.10123E-0	0.071
Mozambique	507	9,223,000	5.49713E-0	0.055
Nepal	339	12,572,000	2.69647E-0	0.027
Netherlands	21,826	13,599,000	0.00160497	1.605
New Zealand	4,110	3,031,000	0.00135598	1.356
Nicaragua	1,400	2,318,000	0.00060390	0.604
Niger	83	4,600,000	1.80435E-0	0.018
Nigeria	4,224	63,049,000	6.69955E-0	0.067
Norway	6,884	4,007,000	0.00171799	1.718
Oman	153	770,000	0.00019870	0.199
Pakistan	17,922	70,560,000	0.00025399	0.254
Panama	1,404	1,678,000	0.0008367	0.837
Paraguay	2,229	2,647,000	0.00084208	0.842
Peru	10,514	15,326,000	0.00068602	0.686
Philippines	13,464	44,437,000	0.00030299	0.303
Poland	58,240	33,841,000	0.00172098	1.721
Portugal	11,101	8,762,000	0.00126692	1.267
Puerto Rico	3,479	2,902,000	0.00119882	1.199
Qatar	96	90,000	0.00106660	1.067
Romania	28,548	21,178,000	0.00134800	1.348

Rwanda	106	4,233,000	2.50413E-0	0.025
Sao Tome and Principe	12	80,000	0.0001	0.150
Saudi Arabia	3,613	8,966,000	0.00040290	0.403
Senegal	305	4,418,000	6.90358E-0	0.069
Seychelles	21	60,000	0.0003	0.350
Singapore	106	2,248,000	4.71530E-0	0.047
Somalia	193	3,170,000	6.08833E-0	0.061
South Africa	12,060	24,663,000	0.00048899	0.489
SPAN	54,992	35,433,000	0.00155	1.552
Sri Lanka	3,245	13,986,000	0.0002320	0.232
Sudan	1,407	18,268,000	7.70199E-0	0.077
Suriname	202	422,000	0.0004786	0.479
Swaziland	65	469,000	0.00013859	0.139
Sweden	14,045	8,291,000	0.00169400	1.694
Switzerland	11,469	6,535,000	0.0017550	1.755
Syria	2,403	7,259,000	0.0003310	0.331
Tanzania	846	15,388,000	5.49779E-0	0.055
Thailand	5,009	42,093,000	0.00011899	0.119
Togo	1,623	2,248,000	0.0007219	0.722
Trinidad and Tobago	550	1,009,000	0.00054509	0.545
Tunisia	1,213	5,747,000	0.00021100	0.211
Turkey	21,696	39,882,000	0.00054400	0.544
UAR United Arab Emirates	681	220,000	0.0030954	3.095
Uganda	431	11,353,000	3.79635E-0	0.038
United Kingdom	75,612	56,427,000	0.00133999	1.340
Upper Volta	109	6,032,000	1.80703E-0	0.018
<b>USA</b>	<b>348,484</b>	<b>213,925,000</b>	<b>0.00162900</b>	<b>1.629</b>
USSR	733,744	255,038,000	0.00287699	2.877
Venezuela	13,105	12,213,000	0.0010730	1.073
Vietnam South	9,000	19,650,000	0.0004580	0.458
Western Somoa	55	160,000	0.000343	0.344
Yemen (Sana)	367	6,668,000	5.50390E-0	0.055
Yugoslavia	27,143	21,322,000	0.00127300	1.273
Zaire	807	24,450,000	3.30061E-0	0.033
Zambia	470	5,004,000	9.39249E-0	0.094
Zimbabwe	916	6,272,000	0.0001460	0.146

	Sum	Sum	Average
Sums (for Doctors/Population)	2,622,08	3,028,196,000	0.681
2.6 million Doctors/ 3.0 billion Persons= Doctors/ Persons in Thousands=		0.000865891	
		0.866	Compare as Doctors per 1,000 People

<b>Country</b>	<b>Doctors</b>	<b>Total Population</b>	<b>Doctors/Person</b>	<b>Doctors Per 1,000 People</b>
		<b>'75</b>		
<b>Bahamas</b>	<b>161</b>	<b>200,000</b>	<b>0.000805</b>	<b>0.805</b>
<b>Barabados</b>	<b>166</b>	<b>245,000</b>	<b>0.000677551</b>	<b>0.678</b>
<b>Canada</b>	<b>39,104</b>	<b>22,801,000</b>	<b>0.001715012</b>	<b>1.715</b>
<b>Costa Rica</b>	<b>1,292</b>	<b>1,994,000</b>	<b>0.000647944</b>	<b>0.648</b>
<b>Cuba</b>	<b>8,201</b>	<b>9,481,000</b>	<b>0.000864993</b>	<b>0.865</b>
<b>El Salvador</b>	<b>1,117</b>	<b>4,108,000</b>	<b>0.000271908</b>	<b>0.272</b>
<b>Grenada</b>	<b>25</b>	<b>100,000</b>	<b>0.00025</b>	<b>0.250</b>
<b>Guatemala</b>	<b>1,207</b>	<b>6,129,000</b>	<b>0.000196933</b>	<b>0.197</b>
<b>Guyana</b>	<b>237</b>	<b>791,000</b>	<b>0.000299621</b>	<b>0.300</b>
<b>Haiti</b>	<b>396</b>	<b>4,552,000</b>	<b>8.69947E-05</b>	<b>0.087</b>
<b>Honduras</b>	<b>920</b>	<b>3,037,000</b>	<b>0.000302931</b>	<b>0.303</b>
<b>Jamaica</b>	<b>570</b>	<b>2,029,000</b>	<b>0.000280927</b>	<b>0.281</b>
<b>Mexico</b>	<b>31,556</b>	<b>59,204,000</b>	<b>0.000533005</b>	<b>0.533</b>
<b>Nicaragua</b>	<b>1,400</b>	<b>2,318,000</b>	<b>0.000603969</b>	<b>0.604</b>
<b>Panama</b>	<b>1,404</b>	<b>1,678,000</b>	<b>0.00083671</b>	<b>0.837</b>
<b>Puerto Rico</b>	<b>3,479</b>	<b>2,902,000</b>	<b>0.001198828</b>	<b>1.199</b>
<b>Trinidad and Tobago</b>	<b>550</b>	<b>1,009,000</b>	<b>0.000545094</b>	<b>0.545</b>
<b>USA</b>	<b>348,484</b>	<b>213,925,000</b>	<b>0.001629001</b>	<b>1.629</b>
<b>Sums (for Doctors &amp; Population)</b>	<b>440,269</b>	<b>336,503,000</b>		<b>0.653</b>
			<b>v</b>	
			<b>e</b>	
			<b>r</b>	
			<b>a</b>	
			<b>g</b>	
			<b>es</b>	
			<b>:</b>	
<b>Doctors/Person=</b>		<b>0.001308366</b>		
<b>Doctors/Thousand</b>		<b>1.308</b>	<b>Compare as</b>	
<b>Persons=</b>			<b>Doctors per</b>	
			<b>1,000 People</b>	

122 Phy/Cap Rdcd Cols 18 Rows

	A	B	C	D	E	F
		Doctors	Total Population	75	Doctors/Person	Doctors Per 1,000 People
1	Country					
2	Bahamas	161	200,000		0.000805	0.805
3	Barabados	166	245,000		0.00067755	0.678
4	Canada	39,104	22,801,000		0.00171501	1.715
5	Costa Rica	1,292	1,994,000		0.00064794	0.648
6	Cuba	8,201	9,481,000		0.00086499	0.865
7	El Salvador	1,117	4,108,000		0.00027191	0.272
8	Grenada	25	100,000		0.00025	0.250
9	Guatemala	1,207	6,129,000		0.00019693	0.197
10	Guyana	237	791,000		0.00029962	0.300
11	Haiti	396	4,552,000		8.6995E-05	0.087
12	Honduras	920	3,037,000		0.00030293	0.303
13	Jamaica	570	2,029,000		0.00028093	0.281
14	Mexico	31,556	59,204,000		0.000533	0.533
15	Nicaragua	1,400	2,318,000		0.00060397	0.604
16	Panama	1,404	1,678,000		0.00083671	0.837
17	Puerto Rico	3,479	2,902,000		0.00119883	1.199
18	Trinidad and Tobago	550	1,009,000		0.00054509	0.545
19	<b>USA</b>	<b>348,484</b>	<b>213,925,000</b>		<b>0.001629</b>	<b>1.629</b>
20						
21						
22						
23						
24						
25						
26						
27	Population)	440,269	336,503,000			0.653
28						
29	Doctors/Person=		0.001308366			
30	Doctors/Thousand Persons=		1.308		Compare as	
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						

<i>Country</i>	<i>Doctors</i>	<i>Total Population</i> <i>'75</i>	<i>Doctors/Person</i>	<i>Doctors Per 1,000 People</i>
<i>Mexico</i>	<i>31,556</i>	<i>59,204,000</i>	<i>0.000533005</i>	<i>0.533</i>
<i>USA</i>	<i>348,484</i>	<i>213,925,000</i>	<i>0.001629001</i>	<i>1.629</i>
<i>Sums (for Doctors &amp; Population)</i>	<i>380,040</i>	<i>273,129,000</i>	<i>0.00139143</i>	<i>1.081</i>
<i>Doctors/Person=</i>		<i>0.00139143</i>		
<i>Doctors/Thousand Persons=</i>		<i>1.391</i>	<i>Compare as</i>	<i>Doctors per 1,000 People</i>

	Country	Total Population '75 (in thousands)	Gross Nat'l Product '78 (In Millions of U.S. Dollars)	Total Population '90 (in thousands) (Statistical Abstract of the United States, 1991 Table 1359)	GNP '90
1	Afghanistan	19,280	\$2,290	15,564	
2	Albania	2,482	\$1,930	3,273	
3	Algeria	16,792	\$25,730	25,337	\$52,194,220,000
4	Andorra			52	
5	Angola	6,394	\$2,810	8,449	
6	Antigua and Barbuda			64	
7	Argentina	25,384	\$53,430	32,291	\$76,529,670,000
8	Armenia			3,357	
9	Aruba			64	
10	Australia	13,809	\$114,780	17,037	\$289,629,000,000
11	Austria	7,538	\$56,450	7,644	\$145,694,640,000
12	Bahamas	200	\$520	249	
13	Bahrain	260	\$1,500	520	
14	Bangladesh	73,746	\$7,280	113,930	\$23,925,300,000
15	Barabados	245	\$520	254	
16	Belgium	9,846	\$95,450	9,909	\$153,985,860,000
17	Belize			220	
18	Benin	3,074	\$740	4,674	\$1,682,640,000
19	Bhutan	1,173	\$90	1,566	\$297,540,000
20	Bolivia	5,410	\$2,700	6,989	\$4,403,070,000
21	Bosnia Herzegovina			4,517	
22	Botswana	691	\$490	1,224	\$2,496,960,000
23	Brazil	109,730	\$180,020	152,505	\$408,713,400,000
24	Brunei			372	
25	Bulgaria	8,793	\$28,310	8,934	\$20,101,500,000
26	Burkina Faso			9,078	\$2,995,740,000
27	Burma	31,240	\$4,480	41,277	
28	Burundi	3,765	\$650	5,646	\$1,185,660,000
29	Byelarus			10,257	
30	Cambodia-cf. Campuchia				
31	Cameroon	6,433	\$3,950	11,092	\$10,648,320,000
32	Canada	22,801	\$203,980	26,538	\$543,232,860,000
33	Cape Verde	292	\$80	375	
34	Central African Republic	1,790	\$510	2,877	\$1,122,030,000

35	Chad	3,947	\$650	5,017	\$953,230,000
36	Chile	10,253	\$15,770	13,083	\$25,381,020,000
37	China / People's Republic of China / Mainland	838,803	\$219,010	1,133,683	\$419,462,710,000
38	Colombia	25,890	\$22,990	33,076	\$41,675,760,000
39	Comoros	306	\$80	460	
40	Congo	1,345	\$850	2,242	\$2,264,420,000
41	Costa Rica	1,994	\$3,390	3,033	\$5,762,700,000
42	Croatia			4,686	
43	Cuba	9,481	\$12,330	10,620	
44	Cyprus	673	\$1,670	702	
45	Czechoslovakia	14,793	\$71,640	15,683	\$49,244,620,000
46	Denmark	5,026	\$54,000	5,131	\$113,292,480,000
47	Djibouti			337	
48	Dominica			85	
49	Dominican Republic	5,118	\$4,600	7,241	\$6,010,030,000
50	Ecuador	7,090	\$7,400	10,507	\$10,296,860,000
51	Egypt	37,543	\$16,890	53,212	\$31,927,200,000
52	El Salvador	4,108	\$2,760	5,310	\$5,894,100,000
53	Equatorial Guinea	313	\$100	369	
54	Estonia			1,584	
55	Ethiopia	28,134	\$3,470	51,407	\$6,168,840,000
56	Fiji	577	\$900	738	
57	Finland	4,652	\$34,020	4,977	\$129,601,080,000
58	France	52,913	\$473,030	56,358	\$1,098,417,420,000
59	Gabon	521	\$2,130	1,068	\$3,556,440,000
60	Gambia	509	\$100	848	
61	Georgia			5,479	
62	Germany			79,123	\$1,766,025,360,000
63	Germany East	17,127	\$94,960		
64	Germany West	61,682	\$631,590	63,232	
65	Ghana	9,873	\$4,160	15,130	\$5,900,700,000
66	Greece	8,930	\$32,430	10,028	\$60,067,720,000
67	Grenada	100	\$60	84	
68	Guatemala	6,129	\$6,130	9,038	\$8,134,200,000
69	Guinea	4,416	\$1,350	7,269	\$3,198,360,000
70	Guinea- Bissau	525	\$120	999	
71	Guyana	791	\$460	753	
72	Haiti	4,552	\$1,150	6,142	\$2,272,540,000
73	Honduras	3,037	\$1,630	4,804	\$2,834,360,000
74	Hong Kong	4,225	\$15,400		\$0
75	Hungary	10,534	\$37,150	10,569	\$29,381,820,000

76	Iceland	216	\$2,130	257	
77	India	613,217	\$117,520	852,667	\$298,433,450,000
78	Indonesia	136,044	\$45,780	190,136	\$108,377,520,000
79	Iran	32,923	\$55,510	57,003	\$141,937,470,000
80	Iraq	11,067	\$22,540	18,782	
81	Ireland	3,131	\$12,280	3,500	\$33,425,000,000
82	Israel	3,417	\$13,760	4,436	\$48,441,120,000
83	Italy	55,023	\$260,940	57,664	\$970,485,120,000
84	Ivory Coast / Cote d'Ivoire	4,885	\$7,460	12,478	\$9,358,500,000
85	Jamaica	2,029	\$2,540	2,469	\$3,703,500,000
86	Japan	111,120	\$884,500	123,567	\$3,142,308,810,000
87	Jordan	2,688	\$2,370	3,273	\$4,058,520,000
88	Kampuchia / Cambodia	8,110		6,991	
89	Kenya	13,251	\$5,180	24,342	\$9,006,540,000
90	Kiribati			70	
91	Korea				\$0
92	Korea North	15,852	\$17,040	21,412	
93	Korea South	34,663	\$48,000	42,792	
94	Kuwait	1,085	\$19,410	2,124	
95	Kyrgystan			4,394	
96	Laos	3,303	\$300	4,024	\$804,800,000
97	Latvia			2,695	
98	Lebanon	2,869	\$3,290	3,339	
99	Lesotho	1,148	\$390	1,755	\$930,150,000
100	Liberia	1,708	\$790	2,640	
101	Libya	2,255	\$19,820	4,223	
102	Liechtenstein			28	
103	Lithuania			3,726	
104	Luxembourg	342	\$4,010	384	
105	Madagascar	8,020	\$2,100	11,801	\$2,714,230,000
106	Malawi	4,909	\$1,040	9,197	\$1,839,400,000
107	Malaysia	12,093	\$15,270	17,556	\$40,729,920,000
108	Maldives	120	\$30	218	
109	Mali	5,697	\$810	8,142	\$2,198,340,000
110	Malta	329	\$770	353	
111	Mauritania	1,283	\$420	1,935	\$967,500,000
112	Mauritius	899	\$850	1,072	\$2,412,000,000
113	Mexico	59,204	\$91,910	88,010	\$219,144,900,000
114	Moldova			4,393	
115	Mongolia	1,446	\$1,100	2,187	
116	Morocco	17,504	\$12,890	25,630	\$24,348,500,000
117	Mozambique	9,223	\$2,380	14,539	\$1,163,120,000
118	Myanmar				
119	Namibia			1,453	
120	Nepal	12,572	\$1,580	19,146	\$3,254,820,000
121	Netherlands	13,599	\$128,270	14,936	\$258,691,520,000
122	New Zealand	3,031	\$17,700	3,296	\$41,793,280,000

123	Nicaragua	2,318	\$2,090	3,602	
124	Niger	4,600	\$1,180	7,879	\$2,442,490,000
125	Nigeria	63,049	\$48,100	118,819	\$34,457,510,000
126	Norway	4,007	\$38,790	4,253	\$98,329,360,000
127	Oman	770	\$2,340	1,481	
128	Pakistan	70,560	\$18,250	114,649	\$43,566,620,000
129	Panama	1,678	\$2,280	2,425	\$4,437,750,000
130	Papua New Guinea	2,716	\$1,820	3,823	\$3,287,780,000
131	Paraguay	2,647	\$2,660	4,660	\$5,172,600,000
132	Peru	15,326	\$11,440	21,906	\$25,410,960,000
133	Philippines	44,437	\$24,410	64,404	\$47,014,920,000
134	Poland	33,841	\$127,560	37,777	\$63,843,130,000
135	Portugal	8,762	\$19,000	10,354	\$50,734,600,000
136	Puerto Rico	2,902	\$8,910		
137	Qatar	90	\$3,310	491	
138	Romania	21,178	\$36,190	23,273	\$38,167,720,000
139	Russia			148,254	
140	Rwanda	4,233	\$870	7,609	\$2,358,790,000
141	Saint Kits and Nevis			40	
142	Saint Vincent and the Grenadines	80	\$43	113	
143	San Marino			23	
144	Santa Lucia			150	
145	Sao Tome and Principe			125	
146	Saudi Arabia	8,966	\$54,200	17,116	\$120,667,800,000
147	Senegal	4,418	\$1,930	7,714	\$5,476,940,000
148	Serbia			9,883	
149	Seychelles	60	\$80	68	
150	Sierra Leone	2,983	\$740	4,166	\$999,840,000
151	Singapore	2,248	\$7,600	2,721	\$30,366,360,000
152	Somalia	3,170	\$340	6,654	\$798,480,000
153	South Africa	24,663	\$43,760	39,539	\$100,033,670,000
154	Soviet Union frmr				
155	Spain	35,433	\$146,940	39,269	\$432,744,380,000
156	Sri Lanka	13,986	\$2,870	17,198	\$8,083,060,000
157	Sudan	18,268	\$5,900	26,245	
158	Suriname	422	\$850	397	
159	Swaziland	469	\$310	837	
160	Sweden	8,291	\$87,260	8,526	\$201,725,160,000
161	Switzerland	6,535	\$81,930	6,742	\$220,328,560,000
162	Syria	7,259	\$7,820	12,483	\$12,483,000,000
163	Taiwan / Republic of China	16,453	\$14,890	20,435	
164	Tajikistan			5,342	

165	Tanzania	15,388	\$4,130	25,971	\$2,856,810,000
166	Thailand	42,093	\$23,390	56,002	\$79,522,840,000
167	Togo	2,248	\$770	3,674	\$1,506,340,000
168	Trinidad and Tobago	1,009	\$3,410	1,271	\$4,588,310,000
169	Tunisia	5,747	\$6,010	8,104	\$11,669,760,000
170	Turkey	39,882	\$53,890	57,285	\$93,374,550,000
171	Turkmenistan			3,658	
172	Tuvalu			9	
173	UAR United Arab Emirates	220	\$12,180	2,254	\$44,764,440,000
174	Uganda	11,353	\$3,470	18,016	\$3,963,520,000
175	Ukraine			51,711	
176	United Kingdom	56,427	\$319,480	57,366	\$923,592,600,000
177	Upper Volta	6,032	\$880		
178	Uruguay	3,108	\$5,170	3,102	\$7,941,120,000
179	USA	213,925	\$2,135,010	250,410	\$5,456,433,900,000
180	USSR	255,038	\$967,820		
181	Uzbekistan			20,569	
182	Venezuela	12,213	\$39,880	19,698	\$50,426,880,000
183	Venuatu			165	
184	Vietnam	43,451		66,171	
185	Vietnam North	23,800			
186	Vietnam South	19,650			
187	Western Somoa	160	\$50	186	
188	Yemen			9,746	
189	Yemen (Aden)	1,660	\$780		
190	Yemen (Sana)	6,668	\$2,301		
191	Yugoslavia	21,322	\$46,140		\$0
192	Zaire	24,450	\$6,480	36,613	\$8,054,860,000
193	Zambia	5,004	\$2,720	8,154	\$3,424,680,000
194	Zimbabwe	6,272	\$3,330	10,394	\$6,652,160,000

		<b>Source:</b> <b>World</b> <b>Handbook of</b> <b>Political and</b> <b>Social</b> <b>Indicators,</b> <b>Third</b> <b>Edition, by</b> <b>Charles L.</b> <b>Taylor and</b> <b>David A.</b> <b>Jodice, Yale</b> <b>University</b> <b>Press, New</b> <b>Haven and</b> <b>London, 1983</b>	<b>Source:</b> <b>World</b> <b>Handbook of</b> <b>Political and</b> <b>Social</b> <b>Indicators,</b> <b>Third</b> <b>Edition, by</b> <b>Charles L.</b> <b>Taylor and</b> <b>David A.</b> <b>Jodice, Yale</b> <b>University</b> <b>Press, New</b> <b>Haven and</b> <b>London, 1983</b>			<b>Computed from</b> <b>Population and GNP per</b> <b>capita</b>
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Exercise Life Expectancy

Average by nation

Average by person