IMMUNIZATION COVERAGE INEQUALITIES

An Overview of Socio-Economic and Gender Differentials in Developing Countries

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Abstract

This note presents a summary overview of information about socio-economic and gender inequalities in full immunization coverage produced by a series of country studies undertaken by the World Bank's thematic group on health, nutrition, population and poverty. The studies provide information, based on analysis of household data collected by the Demographic and Health Survey (DHS) program, concerning poor-rich coverage differences for forty-two countries, and concerning gender coverage differences for forty-one countries.

The principal general findings are:

· *Full immunization rates are considerably higher among the rich than among the poor virtually everywhere. On average, the rate is some 70-75% or 25-30 percentage points greater in the richest than in the poorest quintile of a country's population. Since immunizeable diseases are generally thought to be concentrated primarily among the poor, this means there is a significant mismatch between the population groups with the greatest burden of the diseases that immunizations can prevent, and the population groups that immunization programs most frequently serve.*

· *Notwithstanding what has just been said, full immunization coverage remains far from universal even among the rich. In the average country covered in the reports described above, about one-third of children in even the richest population quintile remains unimmunized. As a result, there remains considerable room to increase country average immunization rates through programs that continue to reach the better-off more frequently than the disadvantaged, as such programs have done thus far, and thereby increase poor-rich inequalities in full immunization coverage.*

· *With the important exception of South Asian countries, male-female disparities in full immunization coverage are generally small, with coverage frequently being as high as or higher among females than among males. As a result, in most parts of the world, socio-economic inequalities in full immunization coverage constitute a much more significant cause for concern than do gender inequalities.*

IMMUNIZATION COVERAGE INEQUALITIES

An Overview of Socio-Economic and Gender Differentials in Developing Countries

Introduction

The attached tables and figures summarize the information concerning immunization coverage inequalities in forty-two developing and transition countries presented in a set of country studies commissioned by the World Bank's thematic group on health, nutrition, population and poverty.

The information presented in the World Bank studies are based on household survey data collected through the Demographic and Health Surveys (DHS) program sponsored by the U.S. Agency for International Development. DHS surveys have thus far taken place in over fifty countries, typically covering 5-10,000 households per country. The surveys, which collect much the same information in each country, focus especially on reproductive, maternal, and child health: birth and death rates, use of different types of maternal and child health services, etc. The surveys do not gather data about household income or expenditure; but the survey instrument does include questions about some 20-30 household characteristics or assets: kind of roof, floor, and/or overall construction; type of water supply and excreta disposal facilities available; possessions like a fan, radio, watch, bicycle, etc.

To derive information about inequalities from the DHS data sets, the World Bank study authors have created a household wealth index by applying a statistical technique called principal components analysis to the asset questions just described. Using the index, the authors ranked individuals within the study populations on the basis of the wealth of the households where they live. The individuals thus ranked were then divided into quintiles – five groups of equal size – and the value for each of approximately thirty health, population, and nutrition indicators were calculated for each quintile. The result was a value, at each socio-economic quintile of the population, for such status indicators as infant mortality, stunting, and total fertility; and service indicators like immunization coverage, medical treatment of diarrhea and acute respiratory infection, and contraceptive prevalence.

The data presented in the tables and figures that follow summarize the information available with respect to full immunization coverage: the percentage of children aged 12-23 months that has received BCG, measles, and three doses each of DPT and oral polio vaccines. The presentation is in two parts. The first covers socio-economic disparities – that is, differences among wealth quintiles of the population. The second part deals with gender disparities.

(Further information about the country studies, including the full text of each, is available at the World Bank's poverty and health website: www.worldbank.org/poverty/health/data/index/htm.)

Socio-Economic Inequalities

The socio-economic inequalities covered by the country studies are summarized in the first three of the seven attached tables and figures: table 1 and figures 1A and 1B. The table presents the basic data; the two figures summarize them.

Table 1 presents information for each of the countries covered by the study project. The information is in four columnar sections:

- The left left-hand column provides the name of each ***region/country*** covered.

- The set of six columns immediately to the right of the region/country name column presents information about the ***quintile coverage rates***. These are the basic data produced by the country studies: that is, the coverage rate in each population quintile, ranked from left to right in order of increasing wealth; plus, in the right-most column, the average coverage rate for the population as a whole.[1]

- The next set of columns – that is, the third set from the left – deals ***with inter-quintile disparities***. The columns in this section contain the values, calculated from data in the quintile coverage rate columns, for each of three disparity indices. The first is the high-low ratio: the full immunization rate in the highest quintile divided by that of the lowest quintile. The second is the absolute difference between richest and poorest: the full immunization rate in the highest quintile minus that of the lowest quintile. The third, presented in the two right-most columns in the section, is the concentration index, a more sophisticated and complex indicator analogous to the Gini Coefficient that is widely used in measuring income disparities. Its possible values range from –1.0, which would occur were all immunizations to occur in the poorest population, to +1.0, which would be recorded if all immunizations were in the wealthiest quintile.

- On the far right of the table is a set of two columns showing ***country ranks*** – that is, how the countries compare with one another, when ranked according to the concentration index from low to high inequality. One column shows how each country ranks relative to all forty-two countries covered by the studies; the other indicates the rank of each country relative to other countries within the same region.

[1] The population average usually differs from the arithmetic mean of the population quintile figures, because the value of each population quintile is weighted according to the number of children aged 12-23 months it contains. Since people in the lower population quintiles tend to have higher fertility than people in the higher population quintiles, there are normally more young children in the lower population quintiles, and the rates in those quintiles are accordingly given a heavier weight in calculating the population average.

Figure 1A summarizes regional differences in full immunization rates among the poorest and richest quintiles.[2] Among other things, the regional figures show that:

- For all forty-two countries together, the average full immunization rate in the richest population quintile is 66.0%, which is about 70% or 30 percentage points higher than the 38.5% full immunization rate in the poorest quintile.

- Roughly similar poor-rich differences exist in all the regions covered, with one notable exception: the two republics of the former Soviet Union (Kyrgyz Republic and Uzbekistan), where the full immunization rates among the poorest and richest population quintiles are approximately equal.

FIGURE 1A: FULL IMMUNIZATION RATES AMONG POOREST AND RICHEST POPULATION QUINTILES -- REGIONAL AVERAGES

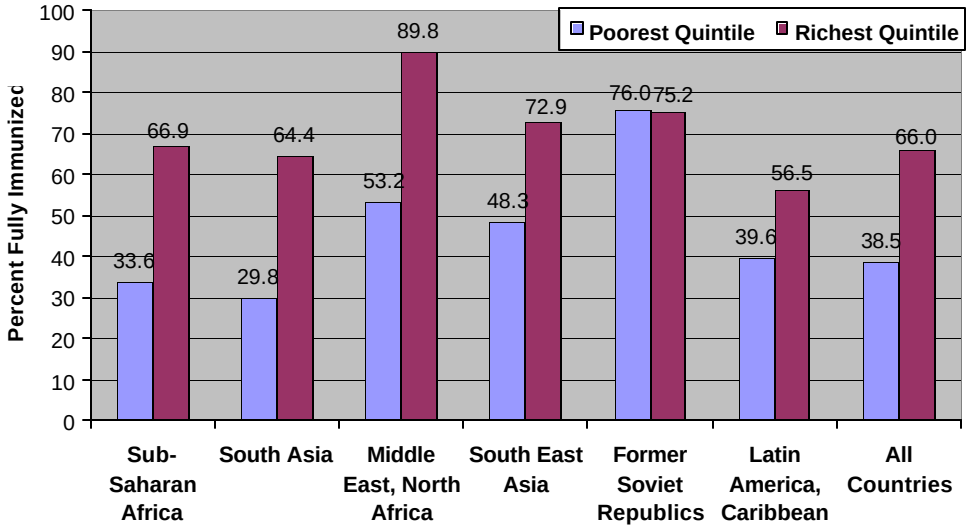


Figure 1B provides country-level data. It is a form of a scatter diagram showing the national average immunization rate on the horizontal axis, and the low-high ratio on the vertical axis.[3] The data suggest that:

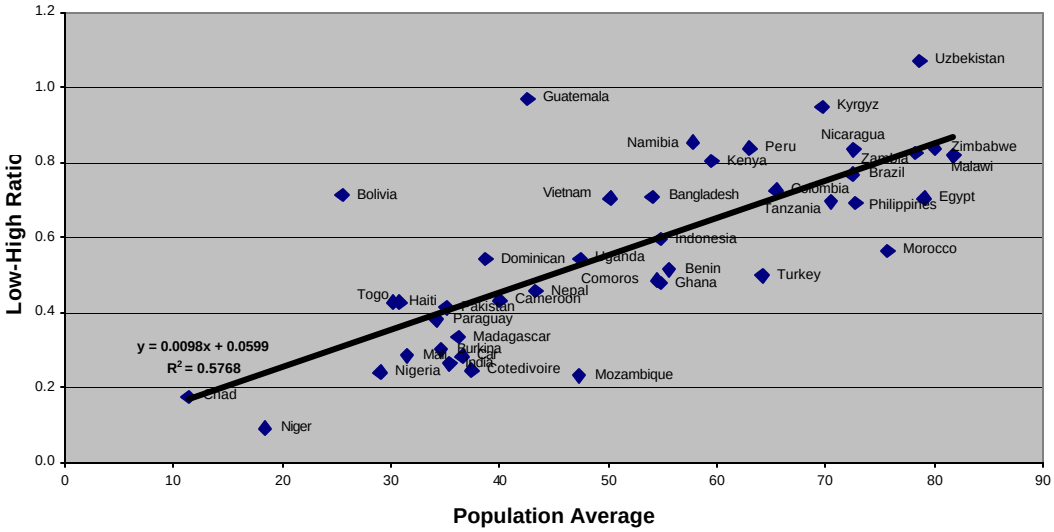
- There is very wide range of differences among countries, with respect both to national averages and to poor-rich disparities within countries. The disparities, which are of special interest here, can be seen by looking at how high or low the countries lie along the vertical axis. The largest disparities are in Niger, at the bottom of the page, where the full immunization rate in the poorest population quintile is less than one-tenth that in the richest quintile. At the other end of the range is Uzbekistan, toward the top of the page,

[2] The regional and global figures shown are unweighted averages for the countries covered.

[3] The low-high ratio, the value of the full immunization rate in the poorest population quintile divided by the rate in the wealthiest population quintile, is the reciprocal of the high-low ratio shown in table 1. A low-high ratio of 1.0 means that the full immunization rate is the same in each population quintile. A low-high ratio of 0.5 means that the full immunization rate in the poorest quintile is half that in the wealthiest, while the rate in the wealthiest quintile is half that in the poorest. Etc.

which is the one country where the full immunization rate is higher among the poorest than among the richest. The remaining countries are distributed more or less evenly between these two extremes.

FIGURE 1B: FULL IMMUNIZATION RATES -- NATIONAL AVERAGES AND POOR RICH DIFFERENCES



- The magnitude of the poor-rich difference in full immunization rates within a country tends to be inversely related to the country's average rate. Poor-rich immunization differences in countries with high average rates tend to be smaller than in countries with low average rates, and vice-versa. This can be seen from the trend line that moves from the lower left to the upper right of the figure.

- There are numerous exceptions to the general inverse relationship just noted. That is, many countries have a much larger or smaller poor-rich difference in full immunization rate than one would expect in view of their average rates. This is shown by the fact that a large number of countries lie well above or below the trend line. For instance, Guatemala, Bolivia, and Uzbekistan are at some distance above the trend line, indicating that poor-wealthy full immunization differences are notably smaller than suggested by their national averages. On the other hand, poor-wealthy immunization differences are considerably larger than expected in countries like Mozambique, Morocco, Turkey, and Niger.

Gender Inequalities

Data for gender inequalities are available for forty-one of the forty-two countries covered in the preceding section. These are presented in table 2, and summarized in figures 2A, 2B, and 2C.

Table 2 concerning gender inequalities is organized in a manner similar to table 1 that covered socio-economic inequalities:

- The left-hand column contains the name of each ***region/country***.

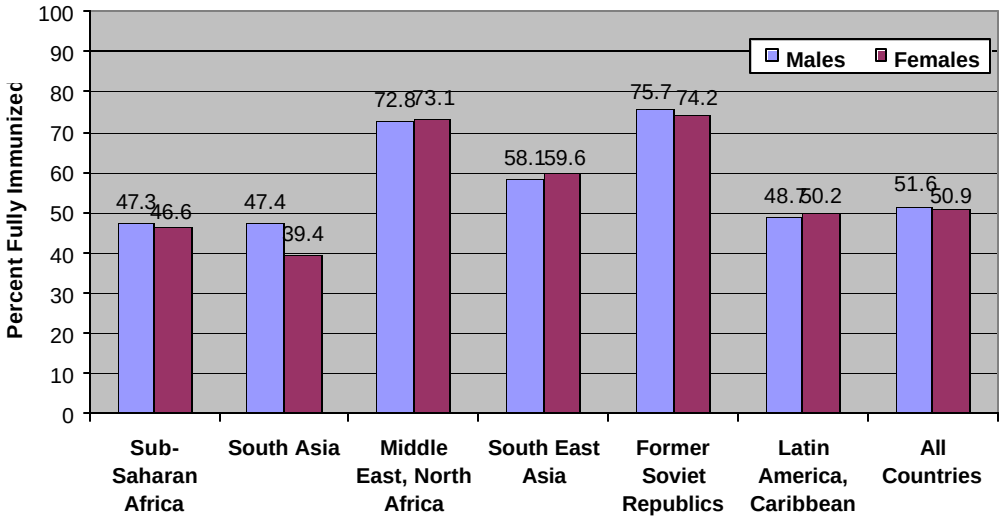
- The next set of columns, immediately to the right of the region/country name column, presents the basic data from the country reports concerning ***coverage rates*** among males, females, and for the two together.

- The next set of columns to the right contains two indices of ***male-female disparities***, calculated from data presented in the section on coverage rates. These are analogous to the first two of the three calculated for socio-economic inequalities and described earlier. One is male/female ratio, which is the rate among males divided by that among females; the other is the absolute difference between males and females, which is obtained by subtracting the rate among females from that among males.

- The final, right-hand set of columns presents ***country ranks***, which shows how countries compare with one another in the world as a whole, and within the regions where they are situated. In each case, the ranking is from low to high with respect to the male/female ratio.

Figure 2A presents regional average figures for gender inequalities in a format similar to that for figure 1A on socio-economic inequalities. From this figure, it can be seen that:

FIGURE 2A: FULL IMMUNZATION RATES AMONG MALES AND FEMALES -- REGIONAL AVERAGES



- Overall, male and female full immunization rates are quite similar. On average, in the forty-one countries the full immunization rate among males is around 52%, only marginally higher than the average rate among females of about 51%. Among the six regions covered, the average male full immunization rate is higher than the female rate in three; the female rate is higher in the other three.

- The one exception to the general pattern of equality just noted is in South Asia, where the average immunization rate among males (47%) is eight points or 18-20% higher than the average rate among females (39%).

Figures 2B and 2C provide regional summaries separately for the poorest and richest quintiles alone. The data presented in those two figures suggest that:

FIGURE 2B: FULL IMMUNIZATION RATES AMONG MALES AND FEMALES IN THE POOREST QUINTILE

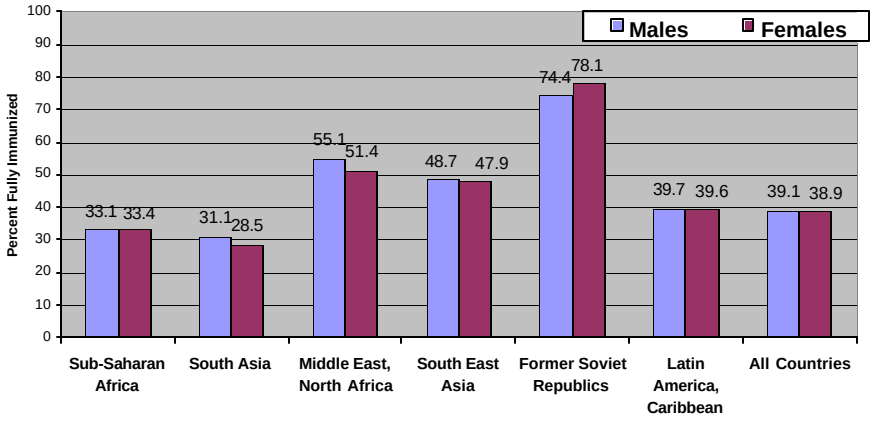
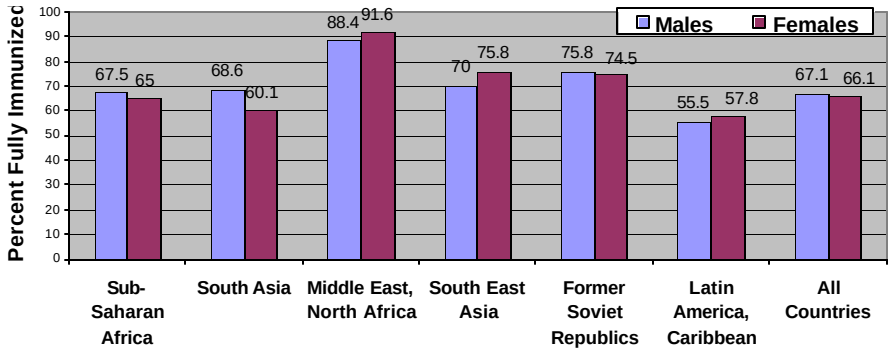


FIGURE 2C: FULL IMMUNIZATION RATES AMONG MALES AND FEMALES IN THE RICHEST QUINTILE



- Full immunization rates are approximately equal not only among the population at large, as seen from figure 1A, but also across socio-economic groups within the population. In the poorest quintile, males and females had virtually the same, 39% full immunization rate on average in the full set of countries covered. Among people in the richest quintile, the 67% full immunization rate for males is only marginally higher than the 66% full immunization rate for females.

- In South Asia, the higher full immunization rates found among males is found among rich as well as among poor. If anything, the gap between male and female full

immunization rates appears higher among the rich than among the poor: male immunization groups being 7.5 percentage points or 11-12% higher in the richest quintile, compared with 2.6 percentage points or around 8% in the poorest quintile.

Discussion

Any detailed analysis of the information presented lies far beyond the scope of this note, whose principal purpose is simply to present basic inequality data for use by people at the country level wishing to compare their situations with those of the other countries. However, in closing it seems appropriate to draw attention to three general observations about the data that have been presented:

- First, full immunization rates are considerably higher among the rich than among the poor virtually everywhere. On average, the rate is some 70-75% or 25-30 percentage points greater in the richest than in the poorest quintile of a country's population. Since immunizeable diseases are generally thought to be concentrated primarily among the poor, this means there is a significant mismatch between the population groups with the greatest burden of the diseases that immunizations can prevent and the population groups that immunization programs most frequently serve.

- Second, notwithstanding what has just been said, full immunization coverage remains far from universal even among the rich. In the average country covered in the reports described above, about one-third of children in even the richest population quintile remains unimmunized. As a result, there remains considerable room to increase country average immunization rates through programs that continue to reach the better-off more frequently than the disadvantaged, as such programs have done thus far, and thereby increase poor-rich inequalities in full immunization coverage.

- Third, with the important exception of South Asian countries, male-female disparities in full immunization coverage are generally small, with coverage frequently being as high as or higher among females than among males. As a result, in most parts of the world, socio-economic inequalities in full immunization coverage constitute a much more significant cause for concern than do gender inequalities.

TABLE 1: FULL IMMUNIZATION COVERAGE IN FORTY-TWO COUNTRIES -- SOCIO-ECONOMIC DIFFERENCES

REGION/COUNTRY	QUINTILE COVERAGE RATES (%)						INTER-QUINTILE DISPARITIES				COUNTRY RANKS (Based on Concentration Index)	
									Concentration Index			
	Poorest Quintile	Second Quintile	Middle Quintile	Fourth Quintile	Richest Quintile	Population Average	High/Low Ratio	Absolute Difference between Richest & Poorest	Value	Standard Error	World Rank	Regional Rank
A: Sub-Saharan Africa	**33.6**	**42.0**	**44.4**	**53.1**	**66.9**	**47.3**	**2.995**	**33.3**	**0.167**	**0.040**		
Benin	37.8	53.4	62.7	59.2	73.6	55.6	1.947	35.8	0.111	0.040	21	A8
Burkina Faso	17.6	31.1	28.2	38.9	58.6	34.6	3.330	41.0	0.198	0.061	33	A13
Cameroon	27.4	27.3	29.9	46.5	63.5	40.0	2.318	36.1	0.190	0.024	32	A12
Central African Republic	18.1	25.3	28.9	45.0	64.0	36.6	3.536	45.9	0.245	0.043	36	A16
Chad	4.0	8.5	5.7	17.1	23.0	11.3	5.750	19.0	0.315	0.060	41	A20
Comoros	39.8	49.5	52.7	60.5	82.0	54.5	2.060	42.2	0.126	0.040	25	A10
Cote d'Ivoire	15.7	27.1	32.7	52.6	64.2	37.4	4.089	48.5	0.255	0.055	37	A17
Ghana	37.5	56.3	48.5	56.0	78.5	54.8	2.093	41.0	0.117	0.049	23	A9
Kenya	48.1	57.6	71.0	64.6	59.9	59.5	1.245	11.8	0.049	0.030	9	A5
Madagascar	22.0	25.2	27.1	54.7	66.0	36.2	3.000	44.0	0.237	0.030	35	A15
Malawi	73.0	78.8	80.3	87.1	89.3	81.8	1.223	16.3	0.038	0.019	7	A4
Mali	15.8	26.2	26.9	34.6	55.6	31.5	3.519	39.8	0.211	0.061	34	A14
Mozambique	19.7	30.8	35.6	69.5	85.3	47.3	4.330	65.6	0.291	0.054	40	A19
Namibia	53.9	58.6	57.2	56.9	63.1	57.8	1.171	9.2	0.022	0.013	4	A1
Niger	4.6	9.7	9.0	19.8	50.9	18.4	11.065	46.3	0.434	0.064	42	A21
Nigeria	13.9	19.7	23.4	35.3	58.1	29.0	4.180	44.2	0.279	0.049	39	A18
Tanzania	57.3	68.8	66.9	79.3	82.5	70.5	1.440	25.2	0.070	0.017	16	A6
Togo	22.2	26.0	32.2	30.3	52.0	30.8	2.342	29.8	0.148	0.057	27	A11
Uganda	34.2	46.0	49.3	47.0	63.1	47.4	1.845	28.9	0.098	0.039	19	A7
Zambia	71.3	77.3	80.0	79.8	86.4	78.3	1.212	15.1	0.035	0.016	6	A3
Zimbabwe	71.8	77.8	84.6	81.4	85.7	80.1	1.194	13.9	0.032	0.012	5	A2
B: South Asia	**29.8**	**31.4**	**41.6**	**49.8**	**64.4**	**42.0**	**2.460**	**34.6**	**0.167**	**0.035**		
Bangladesh	47.2	43.7	60.8	58.8	66.7	54.1	1.413	19.5	0.077	0.014	18	B1
India	17.1	21.7	34.7	48.2	65.0	35.4	3.801	47.9	0.262	0.046	38	B4
Nepal	32.4	34.6	40.8	51.0	71.1	43.3	2.194	38.7	0.150	0.044	28	B2
Pakistan	22.5	25.6	30.2	41.1	54.7	35.1	2.431	32.2	0.179	0.036	31	B3
C: Mid.East, N.Africa	**53.2**	**67.1**	**77.0**	**87.5**	**89.9**	**73.0**	**1.735**	**36.7**	**0.107**	**0.025**		
Egypt	65.1	72.8	81.0	86.6	92.5	79.1	1.421	27.4	0.069	0.014	15	C1
Morocco	53.7	69.1	83.8	92.9	95.2	75.7	1.773	41.5	0.117	0.025	22	C2
Turkey	40.7	59.4	66.3	82.9	81.9	64.2	2.012	41.2	0.135	0.037	26	C3
D: South East Asia	**48.3**	**56.8**	**60.3**	**64.6**	**72.9**	**59.3**	**1.516**	**24.6**	**0.078**	**0.021**		
Indonesia	42.9	47.2	56.5	58.0	72.1	54.8	1.681	29.2	0.098	0.026	20	D3
Philippines	59.8	72.5	76.3	79.6	86.5	72.8	1.446	26.7	0.068	0.019	13	D1
Vietnam	42.2	50.7	48.2	56.3	60.0	50.2	1.422	17.8	0.068	0.018	14	D2
E: Former Sov.Republics	**76.0**	**72.2**	**74.6**	**72.2**	**75.2**	**74.2**	**0.994**	**(0.9)**	**(0.001)**	**0.008**		
Kyrgyz Republic	69.3	64.7	73.4	69.4	73.1	69.7	1.055	3.8	0.012	0.007	3	E2
Uzbekistan	82.7	79.6	75.7	74.9	77.2	78.7	0.933	(5.5)	-0.014	0.010	1	E1
F: L.America/Caribbean	**39.6**	**47.6**	**53.2**	**56.0**	**56.5**	**49.4**	**1.592**	**16.9**	**0.085**	**0.028**		
Bolivia	21.8	24.9	21.0	33.4	30.6	25.5	1.404	8.8	0.075	0.031	17	F6
Brazil	56.6	74.0	84.9	83.1	73.8	72.5	1.304	17.2	0.066	0.032	12	F5
Colombia	53.8	66.9	68.1	70.6	74.1	65.5	1.377	20.3	0.056	0.021	11	F4
Dominican Republic	28.0	30.2	46.9	42.6	51.7	38.7	1.846	23.7	0.124	0.027	24	F7
Guatemala	41.2	43.0	47.1	38.3	42.5	42.6	1.032	1.3	-0.001	0.017	2	F1
Haiti	18.8	20.1	35.3	37.9	44.1	30.2	2.346	25.3	0.172	0.041	29	F8
Nicaragua	61.0	74.6	75.3	85.7	73.1	72.6	1.198	12.1	0.053	0.023	10	F3
Paraguay	20.2	30.8	36.4	40.7	53.0	34.2	2.624	32.8	0.177	0.045	30	F9
Peru	55.3	63.8	63.5	71.7	66.0	63.0	1.193	10.7	0.044	0.014	8	F2

TABLE 2: FULL IMMUNIZATION COVERAGE IN 41 COUNTRIES -- MALE-FEMALE DIFFERENCES

REGION/COUNTRY	COVERAGE RATES			MALE-FEMALE DISPARITIES		COUNTRY RANKS (Based on Male-Female Ratio)	
	Males	Females	Population Average	Male/Female Ratio	Absolute Difference between Males and Females	World Rank	Regional Rank
A: Sub-Saharan Africa	**47.3**	**46.6**	**46.9**	**1.031**	**0.7**		
Benin	54.6	56.5	55.6	0.967	(1.9)	10	A4
Burkina Faso	33.6	35.7	34.6	0.940	(2.1)	5	A2
Cameroon	42.2	37.7	40.0	1.118	4.5	36	A18
Central African Republic	36.0	36.9	36.6	0.976	(0.9)	12	A5
Chad	12.3	10.4	11.3	1.176	1.8	38	A20
Cote d'Ivoire	38.7	36.5	37.4	1.060	2.2	31	A15
Ghana	53.2	56.8	54.8	0.936	(3.7)	4	A1
Kenya	60.7	58.5	59.5	1.038	2.2	27	A13
Madagascar	37.2	35.1	36.2	1.059	2.1	29	A14
Malawi	81.6	82.0	81.8	0.995	(0.4)	16	A7
Mali	32.1	31.0	31.5	1.036	1.1	25	A11
Mozambique	46.3	48.2	47.3	0.959	(2.0)	8	A3
Namibia	57.9	57.2	57.8	1.012	0.7	22	A9
Niger	19.5	17.3	18.4	1.124	2.1	37	A19
Nigeria	30.2	27.5	29.0	1.099	2.7	35	A17
Tanzania	71.7	69.3	70.5	1.035	2.4	24	A10
Togo	31.7	29.9	30.8	1.060	1.8	32	A16
Uganda	48.2	46.5	47.4	1.036	1.7	26	A12
Zambia	78.3	78.2	78.3	1.002	0.1	19	A8
Zimbabwe	79.3	80.8	80.1	0.982	(1.5)	13	A6
B: South Asia	**47.4**	**39.4**	**42.0**	**1.223**	**8.0**		
Bangladesh	55.8	52.1	54.1	1.071	3.7	33	B1
India	47.8	34.4	35.4	1.390	13.4	41	B4
Nepal	46.8	39.8	43.3	1.176	7.0	39	B2
Pakistan	39.2	31.3	35.1	1.253	7.9	40	B3
C: Mid. East, North Africa	**72.9**	**73.1**	**73.0**	**0.998**	**(0.2)**		
Egypt	79.1	78.8	79.1	1.003	0.2	20	C3
Morocco	75.4	76.0	75.7	0.992	(0.6)	15	C1
Turkey	64.2	64.3	64.2	0.998	(0.2)	18	C2
D: South East Asia	**58.1**	**59.6**	**59.3**	**0.977**	**(1.4)**		
Indonesia	53.5	55.8	54.8	0.960	(2.2)	9	D1
Philippines	72.0	73.9	72.8	0.973	(2.0)	11	D2
Vietnam	48.9	49.0	50.2	0.998	(0.1)	17	D3
E: Former Sov.Republics	**75.7**	**74.2**	**74.2**	**1.0**	**1.5**		
Kyrgyz Republic	72.1	68.0	69.7	1.060	4.1	30	E2
Uzbekistan	79.3	80.3	78.7	0.987	(1.0)	14	E1
F: L.America/Caribbean	**48.7**	**50.2**	**49.4**	**0.958**	**(1.4)**		
Bolivia	26.1	24.8	25.5	1.051	1.3	28	F8
Brazil	72.8	72.4	72.5	1.006	0.4	21	F6
Colombia	68.4	62.4	65.5	1.097	6.1	34	F9
Dominican Republic	35.6	41.9	38.7	0.850	(6.3)	2	F2
Guatemala	41.4	43.5	42.6	0.951	(2.1)	6	F4
Haiti	27.7	32.5	30.2	0.853	(4.8)	3	F3
Nicaragua	73.7	71.7	72.6	1.028	2.0	23	F7
Paraguay	31.3	38.0	34.2	0.824	(6.7)	1	F1
Peru	61.6	64.3	63.0	0.958	(2.7)	7	F5