Chapter 9

PIRLS 2006 Sampling Weights and Participation Rates

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9.1 Overview

Rigorous sampling of schools and students was a key component of the PIRLS 2006 project. Implementing the sampling plan was the responsibility of the National Research Coordinator (NRC) in each participating country. NRCs were supported in this endeavor by the PIRLS 2006 sampling consultants—staff from Statistics Canada and the Sampling Unit of the IEA Data Processing and Research Center (DPC)—who conducted the school sampling for most countries and trained the NRCs in selecting probability samples of students and using the *WinW3S: Within-school Sampling Software for Windows (WinW3S)* software provided by the IEA DPC (2005). As an essential part of their sampling activities, NRCs were responsible for providing detailed documentation describing their national sampling plans (sampling data, school sampling frames and school sample selections). The documentation for each PIRLS participant was reviewed and completed by the sampling consultants, including details on coverage and exclusion levels, stratification variables, sampling, participation rates, and variance estimates. The TIMSS & PIRLS International Study Center at Boston College, jointly with the PIRLS 2006 sampling consultants at Statistics Canada and the PIRLS 2006 Sampling Referee, Dr. Keith Rust of Westat, Inc., used this information to evaluate the quality of the samples.

This chapter gives a summary of the major characteristics of the national samples, along with a description of how sampling weights and participation rates are calculated. School and student participation rates for each country also are presented. More detailed summaries of the sample design for each country, including details of population coverage and exclusions, stratification variables, and participation rates, are provided in Appendix B.

9.2 Sampling Implementation

9.2.1 Target Population

As described in Chapter 4, the international desired target population for PIRLS 2006 was the grade that represented 4 years of schooling, counting from the first year of primary or elementary schooling, unless this would result in an average student age of less than 9.5 years. Exhibit 9.1 presents the grade identified as the target grade for sampling by each country, together with the number of years of formal schooling the grade represents and the average age of the students in that grade that were sampled for PIRLS. With few exceptions, the PIRLS 2006 target population in each country did indeed represent the fourth year of formal schooling. However, in England, New Zealand, Scotland, and Trinidad and Tobago children begin primary school at age 5, and therefore these countries assessed students in the fifth year of schooling. Their students were still among the youngest in PIRLS 2006 (9.9 to 10.3 years old). Because of issues related to the language of instruction, Luxembourg and South Africa also tested the fifth grade, even though it meant that their students were older. In Luxembourg, the assessment was conducted in German, which is the language of reading instruction but usually is either the student's second language or a foreign language. In an attempt to conduct the assessment in each student's language of instruction, South Africa tested in 11 different languages.

9.2.2 Population Coverage and Exclusions

Exhibit 9.2 summarizes the population coverage and exclusions for PIRLS 2006. National coverage of the international desired target population was generally comprehensive. All but Georgia, Lithuania, and Moldova sampled from 100 percent of their international desired population. Since coverage was below 100 percent, the results for these countries were footnoted in the PIRLS 2006 international report.

Exhibit 9.1 PIRLS 2006 National Grade Definitions

Country	Country's Name for Grade Tested	Years of Formal Schooling	Mean Age of Students Tested
Austria	Grade 4	4	10.3
Belgium Flemish	Grade 4 primary education	4	10.0
Belgium French	Grade 4	4	9.9
Bulgaria	Grade 4	4	10.9
Canada (Alberta)	Grade 4	4	9.9
Canada (British Columbia)	Grade 4	4	9.8
Canada (Nova Scotia)	Grade 4	4	10.0
Canada (Ontario)	Grade 4	4	9.8
Canada (Quebec)	2nd Year of 2nd Cycle	4	10.1
Chinese Taipei	Elementary school, Grade 4	4	10.1
Denmark	4th Form	4	10.9
England	Year 5	5	10.3
France	Cours Moyen 1	4	10.0
Georgia	Grade 4	4	10.1
Germany	Grade 4	4	10.5
Hong Kong SAR	Primary 4	4	10.0
Hungary	Grade 4	4	10.7
Iceland	Grade 4	4	9.8
Indonesia	Grade 4	4	10.4
Iran, Islamic Rep. Of	4th of Primary School	4	10.2
Israel	Grade 4	4	10.1
Italy	Grade 4 (IV Elementare)	4	9.7
Kuwait	Grade 4	4	9.8
Latvia	Grade 4	4	11.0
Lithuania	Grade 4	4	10.7
Luxembourg	Upper Primary Year 5	5	11.4
Macedonia, Rep of	Grade 4	4	10.6
Moldova, Rep. Of	Grade IV	4	10.9
Morocco	Grade 4 primary	4	10.8
Netherlands	Grade 4	4	10.3
New Zealand	Year 5	5	10.0
Norway	Grade 4	4	9.8
Poland	Grade 4	4	9.9
Qatar	Grade 4	4	9.8
Romania	Grade 4	4	10.9
Russian Federation	4th grade fro 4-year primary school; 3rd grade for 3-year primary school	3 or 4	10.8
Scotland	Primary 5 (P5)	5	9.9
Singapore	Primary 4	4	10.4
Slovak Republic	Grade 4	4	10.4
Slovenia	Grade 3 of 8-year elementary school; Grade 4 of 9-year elementary school	3 or 4	9.9
South Africa	Grade 4	4	10.9
Spain	Grade 4	4	9.9
Sweden	Grade 4	4	10.9
Trinidad and Tobago	Standard 3	5	10.1
United States	Grade 4	4	10.1
Iceland (5)	Grade 5	5	10.8
Norway (5)	Grade 5	5	10.8

Exhibit 9.2 Coverage of PIRLS 2006 Target Population

Countries	International Desired Population		National Desired Population		
	Country Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Austria	100%		1.4%	3.8%	5.1%
Belgium (Flemish)	100%		6.1%	1.1%	7.1%
Belgium (French)	100%		3.7%	0.3%	3.9%
Bulgaria	100%		2.2%	4.3%	6.4%
Canada, Alberta	100%		2.0%	5.2%	7.1%
Canada, British Columbia	100%		2.2%	5.5%	7.6%
Canada, Nova Scotia	100%		0.2%	3.8%	4.0%
Canada, Ontario	100%		1.6%	6.8%	8.3%
Canada, Quebec	100%		2.4%	1.2%	3.6%
Chinese Taipei	100%		1.8%	1.1%	2.9%
Denmark	100%		0.5%	5.7%	6.2%
England	100%		1.6%	0.9%	2.4%
France	100%		3.4%	0.4%	3.8%
Georgia	80%	Students taught in Georgian	2.4%	5.0%	7.3%
Germany	100%		0.4%	0.3%	0.7%
Hong Kong SAR	100%		3.0%	0.9%	3.9%
Hungary	100%		2.3%	1.4%	3.7%
Iceland	100%		1.3%	2.5%	3.8%
Indonesia	100%		3.2%	0.0%	3.2%
Iran, Islamic Rep. of	100%		2.9%	0.9%	3.8%
Israel	100%		17.5%	6.1%	22.5%
Italy	100%		0.1%	5.2%	5.3%
Kuwait	100%		0.3%	0.0%	0.3%
Latvia	100%		4.3%	0.5%	4.7%
Lithuania	93%	Students taught in Lithuanian	0.9%	4.2%	5.1%
Luxembourg	100%		0.9%	3.0%	3.9%
Macedonia, Rep. of	100%		4.6%	0.3%	4.9%
Moldova, Rep. of	91%	Moldova less Predniestrian – Moldovan Republic	0.6%	0.0%	0.6%
Morocco	100%		1.1%	0.0%	1.1%
Netherlands	100%		3.5%	0.1%	3.6%
New Zealand	100%		1.4%	3.9%	5.3%
Norway	100%		1.0%	2.8%	3.8%
Poland	100%		0.9%	4.2%	5.1%
Qatar	100%		0.7%	0.7%	1.4%
Romania	100%		2.4%	0.0%	2.4%
Russian Federation	100%		6.8%	1.0%	7.7%
Scotland	100%		1.4%	0.9%	2.3%
Singapore	100%		0.9%	0.0%	0.9%
Slovak Republic	100%		1.8%	1.9%	3.6%
Slovenia	100%		0.2%	0.5%	0.8%
South Africa	100%		4.2%	0.1%	4.3%
Spain	100%		1.3%	4.0%	5.3%
Sweden	100%		2.4%	1.5%	3.9%
Trinidad and Tobago	100%		0.7%	0.0%	0.7%
United States	100%		3.2%	2.8%	5.9%

Within the national desired population, it was possible to exclude certain types of schools, such as very small or very remote schools, and certain types of students, such as those with a disability that prevented them from participating in the assessment. For the most part, school-level exclusions consisted of schools for students with disabilities and very small or remote schools. However, occasionally schools were excluded for other reasons, as documented in Appendix B. Within-school exclusions generally consisted of disabled students, or students who could not be assessed in the language of the test (Appendix B gives more details about the exclusions for each participant to PIRLS 2006). For most participants, the overall percentage of excluded students (combining school and within-school levels) was less than 5 percent. However, for Belgium (Flemish), Bulgaria, Denmark, Georgia, the Russian Federation, the United States, and the Canadian provinces of Alberta, British Columbia, and Ontario, exclusions accounted for between 5 and 10 percent of the desired population, and only for Israel did exclusions exceed 10 percent. Results for participants with more than 5 percent exclusions were annotated in the international report. Note that some PIRLS participants had no within-school exclusions.

9.2.3 General Sampling Approach

The basic sample design used in PIRLS 2006 is known as a two-stage stratified cluster design,[1] with the first stage consisting of a sample of schools, and the second stage consisting of a sample of intact classrooms from the target grade in the sampled schools. While all participants adopted this basic two-stage design, four countries, with approval from the PIRLS sampling consultants, added an extra sampling stage. The Russian Federation and the United States introduced a preliminary sampling stage, (first sampling regions in the case of the Russian Federation and primary sampling units consisting of metropolitan areas and counties in the case of the United States). Morocco and Singapore also added a third sampling stage; in these cases sub-sampling students within classrooms rather than selecting intact classes.

For countries participating in PIRLS 2006, school stratification was used to enhance the precision of the survey results. Many participants employed explicit stratification, where the complete school sampling frame was divided into smaller sampling frames according to some criterion, such as region, to ensure a predetermined number of schools sampled for each stratum. For example, Austria divided its sampling frame into nine regions to ensure proportional representation by region (see Appendix B for stratification information for each country). Stratification also could be done implicitly, a procedure by which

1 See Chapter 4 for a description of the sample design.

schools in a sampling frame were sorted according to a set of stratification variables prior to sampling. For example, Austria employed implicit stratification by district and school size within each regional stratum. Regardless of the other stratification variables used, all countries used implicit stratification by a measure of size (MOS) of the school.

All countries used a systematic (random start, fixed interval) probability-proportional-to-size (PPS) sampling approach to sample schools. Note that when this method is combined with an implicit stratification procedure, the allocation of schools in the sample is proportional to the size of the implicit strata. Within the sampled schools, classes were sampled using a systematic random method in all countries except Morocco and Singapore, where classes were sampled with probability proportional to size, and students within classes sampled with equal probability.

The PIRLS 2006 sample designs were implemented in an acceptable manner by all participants.

9.2.4 Target Population Sizes

Exhibit 9.3 shows the number of schools and students in each participant's target population, based on the sampling frame used to select the PIRLS 2006 sample, as well as the number of sampled schools and students that participated in the study, and an estimate of the student population size based on the student sample. The sample figures were derived using sampling weights (see Section 9.3). The population size estimate did not take into account the portion of the population excluded within schools, and made no adjustment for changes in the population between the date when the information in the sampling frame was collected and the date of the PIRLS 2006 data collection—usually a 2-year interval. Nevertheless, a comparison of the two estimates of the population size can be seen as a check on the sampling procedure. In most cases, the estimated population size closely matched the population size from the sampling frame.

9.3 Calculating Sampling Weights

The method of estimation used to produce estimates of totals from PIRLS data was through a simple weighted sum of all the responding records for the variables of interest. Estimates of percentages or means then were taken as ratios of these estimated totals. The two-stage stratified cluster PPS design used in PIRLS generally results in differential probabilities of selection of the

Exhibit 9.3 PIRLS 2006 Population and Sample Sizes

Country	Population		Sample			Mean Age
	Schools	Students	Schools	Students	Est. Pop.	
Austria	3,256	96,535	158	5,067	83,170	10.3
Belgium Flemish	2,121	64,240	137	4,479	66,150	10.0
Belgium French	1,664	49,614	150	4,552	47,756	9.9
Bulgaria	2,303	76,056	143	3,863	63,372	10.9
Canada (Alberta)	1,060	40,148	150	4,243	36,657	9.9
Canada (British Columbia)	1,236	45,723	148	4,150	42,963	9.8
Canada (Nova Scotia)	278	10,317	201	4,436	9,672	10.0
Canada (Ontario)	3,736	155,325	180	3,988	139,838	9.8
Canada (Quebec)	1,855	91,895	185	3,748	78,281	10.1
Chinese Taipei	2,170	313,505	150	4,589	304,488	10.1
Denmark	1,896	67,144	145	4,001	63,232	10.9
England	15,114	621,949	148	4,036	551,208	10.3
France	30,731	727,452	169	4,404	739,793	10.0
Georgia	2,063	47,143	149	4,402	44,793	10.1
Germany	18,757	793 946	405	7,899	776,861	10.5
Hong Kong SAR	648	74,952	144	4,712	70,683	10.0
Hungary	2,809	109,750	149	4,068	104,649	10.7
Iceland	136	4,174	128	3,673	4,074	9.8
Indonesia	150,441	4,372,275	168	4,774	4,227,746	10.4
Iran, Islamic Rep. Of	47,562	1,248,474	236	5,411	1,158,946	10.2
Israel	1,742	105,856	149	3,908	85,633	10.1
Italy	7,474	536,285	150	3,581	512,460	9.7
Kuwait	209	27,416	149	3,958	27,420	9.8
Latvia	825	20,575	147	4,162	19,793	11.0
Lithuania	1,118	35,989	146	4,701	32,730	10.7
Luxembourg	171	5,438	178	5,101	5,169	11.4
Macedonia, Rep of	308	25,696	150	4,002	22,928	10.6
Moldova, Rep. Of	1,388	50,258	150	4,036	43,867	10.9
Morocco	15,616	637,009	159	3,249	566,973	10.8
Netherlands	6,831	182,716	139	4,156	176,681	10.3
New Zealand	1,852	58,137	243	6,256	56,576	10.0
Norway	2,413	61,167	135	3,837	61,641	9.8
Poland	13,005	427,500	148	4,854	395,209	9.9
Qatar	124	7,542	119	6,680	7,138	9.8
Romania	7,329	229,632	146	4,273	198,634	10.9
Russian Federation	39,779	1,293,420	232	4,720	1,225,219	10.8
Scotland	2,100	61,326	130	3,775	57,115	9.9
Singapore	178	49,731	178	6,390	49,200	10.4
Slovak Republic	2,068	59,541	167	5,380	52,451	10.4
Slovenia	440	18,050	145	5,337	17,612	9.9
South Africa	15,045	942,494	429	16,073	970,522	10.9
Spain	11,631	406,360	152	4,094	391,084	9.9
Sweden	3,693	117,069	147	4,394	101,809	10.9
Trinidad and Tobago	500	19,915	147	3,951	17,190	10.1
United States	57,917	3,672,510	183	5,190	3,351,959	10.1
Iceland (5)	136	4,174	35	1,379	4,092	10.8
Norway (5)	2,413	61,167	66	1,808	66,051	10.8

students, requiring a unique sampling weight for each participating classroom in the study. The PIRLS 2006 student sampling weight comprised a series of multiplicative components. A basic weight was formed from the inverse of the probability of selecting a student from the population. This basic weight was adjusted by multiplicative factors that account for non-responding schools, classes, and students.

Sampling weights were calculated according to a three-step procedure involving selection probabilities for schools, classrooms, and students. The first step consisted of calculating a school weight, which also incorporated weighting factors from any additional front-end sampling stages such as regions. A school-level participation adjustment was then made in the school weight to compensate for any sampled schools that did not participate and were not replaced. That adjustment was calculated independently for each explicit stratum.

In the second step, a classroom weight reflecting the probability of the sampled classroom(s) being selected from among all the classrooms in the school at the target grade level was calculated. This classroom weight was calculated independently for each participating school. If a sampled classroom in a school did not participate, or if the participation rate among students in a classroom fell below 50 percent, a classroom-level participation adjustment was made to the classroom weight. Classroom participation adjustment could occur only within "participating schools" (a school was considered as a "participating school" if and only if there was at least one sampled classroom with at least 50 percent of its students participating in the study). If one of two (or more) selected classrooms in a school did not participate, the classroom participation adjustment was computed at the explicit stratum level rather than at the school level to reduce the risk of bias.

The third and final step consisted of calculating a student weight. For most PIRLS participants, because intact classrooms were sampled, each student in the sampled classrooms was certain of selection, and so the student weight was 1.0. When students were further sampled within classrooms, as was the case in Morocco and Singapore, a student weight reflecting the probability of the sampled students being selected within the classroom was calculated. A non-participation adjustment was then made to adjust for sampled students who did not take part in the testing. This adjustment was calculated independently for each sampled classroom.

The basic sampling weight attached to each student record was the product of the three intermediate weights: the first stage (school) weight, the second stage (classroom) weight, and the third stage (student) weight. The overall student sampling weight was the product of these three weights including non-participation adjustments.

9.3.1 The First Stage (School) Weight

Essentially, the first stage weight represented the inverse of the probability of a school being sampled on the first stage. The PIRLS 2006 sample design required that school selection probabilities be proportional to the school size, generally defined as enrolment in the target grade. The basic first stage weight for the i^{th} sampled school was thus defined as:

$$BW_{sc}^{i} = \frac{M}{n \cdot m_i}$$

where n was the number of sampled schools, m_i was the measure of size for the i^{th} school, and

$$M = \sum_{i=1}^{N} m_i$$

where N was the total number of schools in the explicit stratum.

For countries such as the Russian Federation and the United States that included a preliminary sampling stage, the basic first stage weight also incorporated the probability of selection in this preliminary stage. The first stage weight in such cases was simply the product of the preliminary stage weight and the first stage weight, as described earlier.

In order to avoid ending up with some basic first stage weights being less than unity, the size of large schools (schools with sizes larger than the sampling interval given by M/n), was set back to the sampling interval. As a result, these large schools were sampled with equal probability without having to use an explicit stratification approach as for previous PIRLS and TIMSS cycles.

In a similar way but for different reasons, the size of small schools (see Chapter 4) was set to a constant so that these small schools could be sampled with equal probability without having to use explicit stratification.

9.3.2 School Non-participation Adjustment

First stage weights were calculated for all sampled and replacement schools that participated (i.e., with at least one sampled classroom with at least half of its students participating in the study). A school-level participation adjustment was required to compensate for schools that were sampled but did not participate, and were not replaced. Sampled schools that were found to be ineligible were removed from the calculation of this adjustment.[2] The school-level participation adjustment was calculated separately for each explicit stratum, as follows:

$$A_{sc} = \frac{n_s + n_{r1} + n_{r2} + n_{nr}}{n_s + n_{r1} + n_{r2}}$$

where n_s was the number of originally sampled schools that participated, n_{r1} and n_{r2} the number of first and second replacement schools, respectively, that participated, and n_{nr} the number of schools that did not participate.

Because in Qatar and Iceland all schools were included in the sample (i.e., census of the school population), the following school-level adjustment was used:

$$A_{sc} = \frac{m_s + m_{nr}}{m_s}$$

where m_s was the number of originally sampled students from schools that participated, and m_{nr} the number of originally sampled students from schools that did not participate.

The final first stage weight for the i^{th} school, corrected for non-participating schools, thus became:

$$FW_{sc}^{i} = A_{sc} \cdot BW_{sc}^{i}$$

9.3.3 The Second Stage (Classroom) Weight

The second stage weight represented the inverse of the probability of a classroom within a sampled school being selected. All but Morocco and Singapore sampled classrooms within schools with equal probability. In these two exceptions, where student sub-sampling was involved, classrooms were sampled using PPS

2 A sampled school was ineligible if it was found to contain no eligible students (i.e., fourth-grade students). Such schools usually were in the sampling frame by mistake, or schools that had recently closed.

techniques. Procedures for calculating sampling weights are presented below for both approaches.

Equal Probability Weighting: For the i^{th} school, let C^i be the total number of classrooms and c^i the number of sampled classrooms in the study. Using equal probability sampling, the basic second stage weight assigned to all sampled classrooms in the ith school was:

$$BW_{cl1}^{i} = \frac{C^i}{c^i}$$

For most PIRLS participants, c^i took the values 1, 2 or 3. Some PIRLS participants sampled all classrooms in a selected school.

Probability Proportional to Size Weighting (Morocco and Singapore only): For the i^{th} school, let $k^{i,j}$ be the size of the j^{th} classroom. Using PPS sampling, the final second stage weight assigned to the j^{th} sampled classroom in the i^{th} school was:

$$BW_{cl2}^{i,j} = \frac{K^i}{c^i \cdot k^{i,j}}$$

where c^i was the number of sampled classrooms in the i^{th} school, as defined earlier, and

$$K^i = \sum_{j=1}^{c^i} k^{i,j}$$

Singapore sampled two classrooms $(c^i = 2)$ and Morocco sampled a single classroom $(c^i = 1)$.

9.3.4 Classroom Non-participation Adjustment

Second stage weights were calculated for all sampled classrooms in the sampled schools and replacement schools that participated. A classroom-level participation adjustment was applied to compensate for classrooms that did not participate or where student participation rate was below 50 percent. Sampled classrooms with student participation below 50 percent were given a weight of zero and considered to be non-participating. The classroom-level participation

adjustment was calculated separately for each explicit stratum rather than school to minimize the risk of bias.

The adjustment was calculated as follows:

$$A_{cl} = \frac{\sum_{i}^{s+r1+r2} 1/c^i}{\sum_{i}^{s+r1+r2} \delta_i / c^i}$$

where c^i was the number of sampled classrooms in the i^{th} school, as defined earlier, and δ_i takes on value 1 if the classroom participated and 0 otherwise.

When no sub-sampling of classrooms was involved, the final second stage weight assigned to all sampled classrooms in the i^{th} school became:

$$FW_{cl1}^{i} = A_{cl} \cdot BW_{cl1}^{i}$$

When classrooms were sub-sampled within schools, the final second stage weight assigned to the j^{th} sampled classroom in the i^{th} school became:

$$FW_{cl2}^{i,j} = A_{cl} \cdot BW_{cl2}^{i,j}$$

9.3.5 The Third Stage (Student) Weight

The third stage weight represented the inverse of the probability of a student in a sampled class being selected. When intact classrooms that included all students were sampled, as was the case for all but two PIRLS 2006 participants, this probability was unity. However, the probability of selection varied when students were sampled within classrooms. Procedures for calculating weights are presented below for both sampling approaches. The third stage weight is calculated independently for each sampled classroom.

Sampling Intact Classrooms: The basic third stage weight for the j^{th} classroom in the i^{th} school was simply:

$$BW_{st1}^{i,j} = 1.0$$

Subsampling Students: (Morocco and Singapore only) The basic third stage weight for the j^{th} classroom in the i^{th} school was:

$$BW_{st2}^{i,j} = \frac{k^{i,j}}{s^{i,j}}$$

where $k^{i,j}$ was the size of the j^{th} classroom in the i^{th} school, as defined earlier, and $s^{i,j}$ was the number of sampled students per sampled classroom.

9.3.6 Adjustment for Student Non-participation

The student non-participation adjustment was calculated for each participating classroom as follows:

$$A_{st}^{i,j} = \frac{s_{rs}^{i,j} + s_{nr}^{i,j}}{s_{rs}^{i,j}}$$

where $s_{rs}^{i,j}$ was the number of eligible students that participated in the j^{th} classroom of the i^{th} school and $s_{nr}^{i,j}$ was the number of eligible students that did not participate in the j^{th} classroom of the i^{th} school.

The third and final stage weight for students the j^{th} classroom in the i^{th} school thus became:

$$FW_{st}^{i,j} = A_{st}^{i,j} \cdot BW_{st\Delta}^{i,j}$$

where Δ equals 1 when there was no student sub-sampling and 2 when students were sub-sampled within classrooms.

9.3.7 Overall Sampling Weight

The overall sampling weight was simply the product of the final first stage weight, the final second stage weight, and the final third stage weight. For example, when no sub-sampling of classrooms was involved, this product is given by:

$$W^{i,j} = FW_{sc}^{i} \cdot FW_{cl1}^{i} \cdot FW_{st1}^{i,j}$$

or

$$W^{i,j} = A_{sc} \cdot BW^{i}_{sc} \cdot FW^{i}_{cl1} \cdot A^{i,j}_{st} BW^{i,j}_{st\Delta}$$

When classrooms were sub-sampled within schools, the overall sampling weight was:

$$W^{i,j} = FW^{i}_{sc} FW^{i,j}_{cl2} \cdot FW^{i,j}_{st\Delta}$$

or

$$W^{i,j} = A_{sc} \cdot BW^{i}_{sc} \cdot FW^{i,j}_{cl2} \cdot A^{i,j}_{st} BW^{i,j}_{st\Delta}$$

It is important to note that sampling weights vary by school and classroom, but that participating students within the same classroom have the same sampling weights. It is also important to note that sampling weights were calculated separately by explicit stratum.

9.4 Calculating School and Student Participation Rates

Since non-participation by sampled schools, classrooms, or students can lead to bias in the study results, a variety of participation rates were computed to show the level of success each PIRLS participant achieved in securing participation from their sampled schools, classrooms, and students. To monitor school participation, two school participation rates were computed: one based on originally sampled schools only, and one based on sampled and both first and second replacement schools. Classroom and student participation rates also were computed, as were overall participation rates.

9.4.1 Unweighted School Participation Rates

The two unweighted school participation rates that were computed were the following:

R^{sc-s}_{unw} = unweighted school participation rate for originally sampled schools only

R^{sc-r}_{unw} = unweighted school participation rate, including sampled, first and second replacement schools.

Each unweighted school participation rate was defined as the ratio of the number of participating schools to the number of originally sampled schools, excluding any ineligible schools. A school was labelled as a "participating school" if at least one of its sampled classrooms had at least a 50 percent student participation rate. The rates were calculated as follows:

$$R_{unw}^{sc-s} = \frac{n_s}{n_s + n_{r1} + n_{r2} + n_{nr}}$$

$$R_{unw}^{sc-r} = \frac{n_s + n_{r1} + n_{r2}}{n_s + n_{r1} + n_{r2} + n_{nr}}$$

9.4.2 Unweighted Classroom Participation Rates

The unweighted classroom participation rate was computed as follows:

$$R_{unw}^{cl} = \frac{\sum_{i}^{s+r1+r2} c_{\star}^{i}}{\sum_{i}^{s+r1+r2} c_i}$$

where c^i was the number of sampled classrooms in the i^{th} school, and $c_{\star}^{i}$ was the number of participating sampled classrooms in the i^{th} school. Both summations are over all participating schools.

9.4.3 Unweighted Student Participation Rates

The unweighted student participation rate was computed as follows where summations are done over all participating schools and over all classrooms with at least 50 percent of its students participating in the study:

$$R_{unw}^{st} = \frac{\sum_{i,j} s_{rs}^{i,j}}{\sum_{i,j} s_{rs}^{i,j} + \sum_{i,j} s_{nr}^{i,j}}$$

9.4.4 Unweighted Overall Participation Rates

Two unweighted overall participation rates were computed for each PIRLS participant. They were as follows:

R_{unw}^{ov-s} = unweighted school participation rate for originally sampled schools only

R_{unw}^{ov-r} = unweighted school participation rate, including sampled, first and second replacement schools.

For each PIRLS participant, the overall participation rate was defined as the product of the unweighted school participation rate, unweighted classroom participation rate, and the unweighted student participation rate. They were calculated as follows:

$$R_{unw}^{ov-s} = R_{unw}^{sc-s} \cdot R_{unw}^{cl} \cdot R_{unw}^{st}$$

$$R_{unw}^{ov-r} = R_{unw}^{sc-r} \cdot R_{unw}^{cl} \cdot R_{unw}^{st}$$

9.4.5 Weighted School Participation Rates

Two weighted school-level participation rates were computed for each PIRLS participant. They were as follows:

R_{wtd}^{sc-s} = weighted school participation rate for originally sampled schools only

R_{wtd}^{sc-r} = weighted school participation rate, including sampled, first and second replacement schools.

The weighted school participation rates were calculated as follows:

$$R_{wtd}^{sc-s} = \frac{\sum_{i,j}^{s} BW_{sc}^{i} \cdot FW_{cl\Delta}^{i,j} \cdot FW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} FW_{sc}^{i} \cdot FW_{cl\Delta}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

$$R_{wtd}^{sc-r} = \frac{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot FW_{cl\Delta}^{i,j} \cdot FW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} FW_{sc}^{i} \cdot FW_{cl\Delta}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

where both the numerator and denominator were summations over all responding students and the appropriate classroom-level and student-level sampling weights were used. Δ takes the value one when no sub-sampling was involved and two otherwise. Note that the basic school-level weight appears in the numerator, whereas the final school-level weight appears in the denominator.

The denominator remains unchanged in all three equations and is the weighted estimate of the total enrolment in the target population. The numerator, however, changes from one equation to the next. Only students from originally sampled schools and from classrooms with at least 50 percent of their students participating in the study were included in the first equation. Students from first replacement schools were added in the second equation, and students from first and second replacement schools were added in the third equation.

9.4.6 Weighted Classroom Participation Rates

The weighted classroom participation rate was computed as follows:

$$R_{wtd}^{cl} = \frac{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot BW_{cl\Delta}^{i,j} \cdot FW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot FW_{cl\Delta}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

where both the numerator and denominator were summations over all responding students from classrooms with at least 50 percent of their students participating in the study, and the appropriate student-level sampling weights were used. Note that the basic classroom-level weight appears in the numerator, whereas the final classroom-level weight appears in the denominator. Furthermore, the denominator in this formula was the same quantity that appears in the numerator of the weighted school-level participation rate for all participating schools, either sampled or replacement.

9.4.7 Weighted Student Participation Rates

The weighted student participation rate was computed as follows:

$$R_{wtd}^{st} = \frac{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot BW_{cl\Delta}^{i,j} \cdot BW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot BW_{cl\Delta}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

where both the numerator and denominator were summations over all responding students from participating schools. Note that the basic student-level weight appears in the numerator, whereas the final student-level weight appears in the denominator. Furthermore, the denominator in this formula was the same quantity that appears in the numerator of the weighted classroom-level participation rate for all participating schools, either sampled or replacement.

9.4.8 Weighted Overall Participation Rates

Two weighted overall participation rates were computed. They were as follows:

R_{wtd}^{ov-s} = weighted overall participation rate for originally sampled schools only

R_{wtd}^{ov-r} = weighted overall participation rate, including sampled, first and second replacement schools.

Each weighted overall participation rate was defined as the product of the appropriate weighted school participation rate, weighted classroom participation rate, and the weighted student participation rate. They were computed as follows:

$$R_{wtd}^{ov-s} = R_{wtd}^{sc-s} \cdot R_{wtd}^{cl} \cdot R_{wtd}^{st}$$

$$R_{wtd}^{ov-r} = R_{wtd}^{sc-r} \cdot R_{wtd}^{cl} \cdot R_{wtd}^{st}$$

Weighted school, classroom, student, and overall participation rates were computed for each PIRLS participant using these procedures.

9.5 Meeting PIRLS's Standards for Sampling Participation

PIRLS participants understood that the goal for sampling participation was 100 percent for all sampled schools, classrooms, and students. Guidelines for reporting achievement data for PIRLS participants securing less than full participation were modeled after IEA's TIMSS and PIRLS previous studies. As summarized in Exhibit 9.4, countries were assigned to one of three categories on the basis of their sampling participation. Countries in Category 1 were considered to have met the PIRLS 2006 sampling requirements, and to have an acceptable participation rate. Countries in Category 2 met the participation requirements only after including replacement schools. Countries that failed to meet the participation requirements even with the use of replacement schools were assigned to Category 3. One of the main goals for quality data in PIRLS 2006 was to have as many countries as possible achieve Category 1 status.

Exhibits 9.5 through 9.8 present the school, classroom, student, and overall participation rates and achieved sample sizes for each of the PIRLS 2006 participants. Almost all participants had excellent participation rates and belong in Category 1. However, Belgium (Flemish), the Netherlands, Scotland, and the United States met the sampling requirements only after including replacement schools, and therefore belong in Category 2. Although Norway had overall participation rates after including replacement schools of just below 75 percent (71%), it was decided during the sampling adjudication that this rate did not warrant placement in Category 3. Instead, results for that country in the international report were annotated with a double-obelisk, indicating that they nearly satisfied the guidelines for sample participation rates after including replacement schools.

Exhibit 9.4 Categories of Sampling Participation

Category 1	Acceptable sampling participation rate without the use of replacement school. In order to be placed in this category, a country had to have: • An unweighted school response rate without replacement of at least 85% (after rounding to the nearest whole percent) AND an unweighted student response rate (after rounding) of at least 85%. OR • A weighted school response rate without replacement of at least 85% (after rounding to the nearest whole percent) AND a weighted student response rate (after rounding) of at least 85%. OR • The product of the (unrounded) weighted school response rate without replacement and the (unrounded) weighted student response rate of at least 75% (after rounding to the nearest whole percent). Countries in this category appeared in the international report exhibits, without annotation ordered by achievement as appropriate.
Category 2	Acceptable sampling participation rate only when replacement schools were included. A country was placed in category 2 if: • It failed to meet the requirements for Category 1 but had either an unweighted or weighted school response rate without replacement of at least 50% (after rounding to the nearest percent). AND HAD EITHER • An unweighted school response rate with replacement of at least 85% (after rounding to the nearest whole percent) AND an unweighted student response rate (after rounding) of at least 85%. OR • A weighted school response rate with replacement of at least 85% (after rounding to nearest whole percent) AND a weighted student response rate (after rounding) of at least 85%. OR • The product of the (unrounded) weighted school response rate with replacement and the (unrounded) weighted student response rate of at least 75% (after rounding to the nearest whole percent). Countries in this category were annotated in the international report exhibits, and ordered by achievement as appropriate.
Category 3	Unacceptable sampling response rate even when replacement schools are included. Countries that could provide documentation to show that they complied with PIRLS sampling procedures and requirements, but did not meet the requirements for Category 1 or Category 2 were placed in Category 3. Countries in this category would appear in a separate section of the achievement exhibits, below the other countries, in the international report. These countries were presented in alphabetical order.

9.6 Trends in Student Populations

Because an important goal of the PIRLS 2006 assessment was to measure changes in fourth-grade students' reading achievement since 2001, it is important to track any changes in population composition and coverage since then that might be related to student achievement. Exhibit 9.9 presents, for each country, four attributes of the populations sampled in 2001 and 2006: number of years of formal schooling, average student age, the score on the UNDP's human development index, and the percentage of students in the national desired population excluded from the assessment. Most countries and provinces were very similar with regard to these attributes across the two years, although it is noteworthy than the Russian Federation and Slovenia underwent structural changes in the age at which children enter schools that are reflected in their samples. In 2001, the Russian sample contained third-grade students from some regions and fourth-grade students from others, whereas all students were in fourth grade in 2006. Slovenia is in transition towards having all children begin school at an earlier age so that they all will have four years of primary schooling instead of three years, as was the case in 2001. However, the transition was not complete in 2006.

Exhibit 9.5 PIRLS 2006 School Participation Rates and Sample Sizes

Country	School Participation Before Replacement (Weighted Percentage)	School Participation After Replacement (Weighted Percentage)	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample That Participated	Number of Replacement Schools That Participated	Total Number of Schools That Participated
Austria	100%	100%	160	158	158	0	158
Belgium Flemish	69%	92%	150	149	102	35	137
Belgium French	85%	100%	150	150	129	21	150
Bulgaria	88%	97%	150	147	130	13	143
Canada (Alberta)	100%	100%	150	150	150	0	150
Canada (British Columbia)	98%	99%	150	150	147	1	148
Canada (Nova Scotia)	99%	100%	201	201	200	1	201
Canada (Ontario)	88%	90%	200	198	173	7	180
Canada (Quebec)	96%	96%	200	194	185	0	185
Chinese Taipei	98%	100%	150	150	147	3	150
Denmark	89%	99%	150	146	128	17	145
England	86%	99%	150	150	129	19	148
France	94%	97%	175	175	164	5	169
Georgia	94%	100%	152	149	139	10	149
Germany	97%	99%	410	407	397	8	405
Hong Kong SAR	91%	100%	150	144	130	14	144
Hungary	99%	100%	150	149	147	2	149
Iceland	99%	99%	136	131	128	0	128
Indonesia	99%	100%	170	168	166	2	168
Iran, Islamic Rep. Of	100%	100%	240	236	235	1	236
Israel	98%	100%	150	149	146	3	149
Italy	91%	100%	150	150	136	14	150
Kuwait	99%	99%	150	150	149	0	149
Latvia	97%	98%	150	150	145	2	147
Lithuania	99%	100%	150	146	144	2	146
Luxembourg	100%	100%	183	178	178	0	178
Macedonia, Rep of	100%	100%	150	150	149	1	150
Moldova, Rep. Of	98%	100%	150	150	148	2	150
Morocco	98%	99%	160	160	156	3	159
Netherlands	70%	93%	150	150	104	35	139
New Zealand	92%	99%	250	250	220	23	243
Norway	68%	82%	178	177	118	17	135
Poland	99%	100%	150	148	147	1	148
Qatar	100%	100%	123	119	119	0	119
Romania	99%	99%	150	147	146	0	146
Russian Federation	100%	100%	232	232	232	0	232
Scotland	69%	87%	150	150	101	29	130
Singapore	100%	100%	178	178	178	0	178
Slovak Republic	93%	98%	174	171	155	12	167
Slovenia	93%	97%	150	150	140	5	145
South Africa	96%	99%	441	438	422	7	429
Spain	99%	100%	152	152	149	3	152
Sweden	100%	100%	150	147	147	0	147
Trinidad and Tobago	99%	99%	150	149	147	0	147
United States	57%	86%	222	214	120	63	183
Iceland (5)	100%	100%	35	35	35	0	35
Norway(5)	51%	68%	105	105	56	10	66

Exhibit 9.6 PIRLS 2006 School Sample Sizes

Country	Within School Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/ School	Number of Students Excluded	Number of Students Eligible	Number of Students Absent	Number of Students Assessed
Austria	98%	5,431	24	208	5,199	132	5,067
Belgium Flemish	99%	4,608	10	47	4,551	72	4,479
Belgium French	95%	4,810	19	14	4,777	225	4,552
Bulgaria	97%	4,156	37	135	3,984	121	3,863
Canada (Alberta)	96%	4,773	79	250	4,444	201	4,243
Canada (British Columbia)	95%	4,663	68	244	4,351	201	4,150
Canada (Nova Scotia)	96%	4,884	79	189	4,616	180	4,436
Canada (Ontario)	97%	4,436	40	252	4,144	156	3,988
Canada (Quebec)	84%	4,639	50	99	4,490	742	3,748
Chinese Taipei	99%	4,746	62	55	4,629	40	4,589
Denmark	97%	4,349	51	154	4,144	143	4,001
England	93%	4,492	117	38	4,337	301	4,036
France	98%	4,558	55	16	4,487	83	4,404
Georgia	98%	4,837	120	209	4,508	106	4,402
Germany	94%	8,395	49	44	8,302	403	7,899
Hong Kong SAR	97%	4,917	25	34	4,858	146	4,712
Hungary	97%	4,265	17	46	4,202	134	4,068
Iceland	91%	4,200	47	102	4,051	378	3,673
Indonesia	98%	4,981	99	0	4,882	108	4,774
Iran, Islamic Rep. Of	99%	5,609	122	22	5,465	54	5,411
Israel	93%	4,378	5	179	4,194	286	3,908
Italy	97%	3,882	31	153	3,698	117	3,581
Kuwait	89%	4,467	0	0	4,467	509	3,958
Latvia	94%	4,469	14	17	4,438	276	4,162
Lithuania	92%	5,400	67	183	5,150	449	4,701
Luxembourg	99%	5,342	15	158	5,169	68	5,101
Macedonia, Rep of	96%	4,209	33	11	4,165	163	4,002
Moldova, Rep. Of	95%	4,281	32	0	4,249	213	4,036
Morocco	95%	3,444	43	0	3,401	152	3,249
Netherlands	97%	4,366	63	5	4,298	142	4,156
New Zealand	96%	6,872	130	196	6,546	290	6,256
Norway	87%	4,570	27	134	4,409	572	3,837
Poland	95%	5,410	21	232	5,157	303	4,854
Qatar	94%	7,490	305	47	7,138	458	6,680
Romania	98%	4,463	97	0	4,366	93	4,273
Russian Federation	97%	4,911	20	35	4,856	136	4,720
Scotland	94%	4,123	66	41	4,016	241	3,775
Singapore	95%	6,760	67	0	6,693	303	6,390
Slovak Republic	96%	5,741	34	105	5,602	222	5,380
Slovenia	96%	5,596	12	27	5,557	220	5,337
South Africa	91%	17,934	475	35	17,424	1,351	16,073
Spain	97%	4,391	12	143	4,236	142	4,094
Sweden	96%	4,653	33	33	4,587	193	4,394
Trinidad and Tobago	95%	4,237	77	0	4,160	209	3,951
United States	96%	5,761	160	159	5,442	252	5,190
Iceland (5)	88%	1,618	15	42	1,561	182	1,379
Norway (5)	84%	2,238	14	62	2,162	354	1,808

Exhibit 9.7 PIRLS 2006 Participation Rates (Unweighted)

Country	School Participation Before Replacement	School Participation After Replacement	Classes Participation	Student Participation	Overall Participation Before Replacement	Overall Participation After Replacement
Austria	100%	100%	99%	98%	97%	97%
Belgium Flemish	69%	92%	100%	98%	67%	91%
Belgium French	86%	100%	100%	95%	82%	95%
Bulgaria	88%	97%	100%	97%	85%	94%
Canada (Alberta)	100%	100%	100%	96%	96%	96%
Canada (British Columbia)	98%	99%	100%	95%	94%	94%
Canada (Nova Scotia)	100%	100%	100%	96%	96%	96%
Canada (Ontario)	87%	91%	100%	96%	84%	88%
Canada (Quebec)	95%	95%	100%	84%	80%	80%
Chinese Taipei	98%	100%	100%	99%	97%	99%
Denmark	88%	99%	100%	97%	85%	96%
England	86%	99%	100%	93%	80%	92%
France	94%	97%	100%	98%	92%	95%
Georgia	93%	100%	100%	98%	91%	98%
Germany	98%	100%	100%	95%	93%	95%
Hong Kong SAR	90%	100%	100%	97%	88%	97%
Hungary	99%	100%	100%	97%	96%	97%
Iceland	98%	98%	100%	91%	89%	89%
Indonesia	99%	100%	100%	98%	97%	98%
Iran, Islamic Rep. Of	100%	100%	100%	99%	99%	99%
Israel	98%	100%	100%	93%	91%	93%
Italy	91%	100%	100%	97%	88%	97%
Kuwait	99%	99%	99%	89%	88%	88%
Latvia	97%	98%	100%	94%	91%	92%
Lithuania	99%	100%	100%	91%	90%	91%
Luxembourg	100%	100%	100%	99%	99%	99%
Macedonia, Rep of	99%	100%	100%	96%	95%	96%
Moldova, Rep. Of	99%	100%	100%	95%	94%	95%
Morocco	98%	99%	100%	96%	93%	95%
Netherlands	69%	93%	100%	97%	67%	90%
New Zealand	88%	97%	100%	96%	84%	93%
Norway	67%	76%	100%	87%	58%	66%
Poland	99%	100%	100%	94%	94%	94%
Qatar	100%	100%	100%	94%	94%	94%
Romania	99%	99%	100%	98%	97%	97%
Russian Federation	100%	100%	100%	97%	97%	97%
Scotland	67%	87%	100%	94%	63%	82%
Singapore	100%	100%	100%	96%	96%	96%
Slovak Republic	91%	98%	100%	96%	87%	94%
Slovenia	93%	97%	100%	96%	90%	93%
South Africa	96%	98%	100%	92%	89%	90%
Spain	98%	100%	100%	97%	95%	97%
Sweden	100%	100%	100%	96%	96%	96%
Trinidad and Tobago	99%	99%	100%	95%	94%	94%
United States	56%	86%	100%	95%	53%	81%
Iceland (5)	100%	100%	100%	88%	88%	88%
Norway (5)	53%	63%	97%	84%	43%	51%

Exhibit 9.8 PIRLS 2006 Participation Rates (Weighted)

Countries	School Participation		Classroom Participation	Student Participation	Overall Participation	
	Before Replacement	After Replacement			Before Replacement	After Replacement
Austria	100%	100%	99%	98%	97%	97%
Belgium (Flemish)	69%	92%	100%	99%	68%	91%
Belgium (French)	85%	100%	100%	95%	81%	95%
Bulgaria	88%	97%	100%	97%	85%	94%
Canada, Alberta	100%	100%	100%	96%	96%	96%
Canada, British Columbia	98%	99%	100%	95%	93%	94%
Canada, Nova Scotia	99%	100%	100%	96%	96%	96%
Canada, Ontario	88%	90%	100%	97%	85%	87%
Canada, Quebec	96%	96%	100%	84%	81%	81%
Chinese Taipei	98%	100%	100%	99%	97%	99%
Denmark	89%	99%	100%	97%	86%	96%
England	86%	99%	100%	93%	80%	92%
France	94%	97%	100%	98%	92%	95%
Georgia	94%	100%	100%	98%	93%	98%
Germany	97%	99%	100%	94%	90%	92%
Hong Kong SAR	91%	100%	100%	97%	89%	97%
Hungary	99%	100%	100%	97%	96%	97%
Iceland	99%	99%	100%	91%	90%	90%
Indonesia	99%	100%	100%	98%	97%	98%
Iran, Islamic Rep. of	100%	100%	100%	99%	99%	99%
Israel	98%	100%	100%	93%	91%	93%
Italy	91%	100%	100%	97%	88%	97%
Kuwait	99%	99%	99%	89%	88%	88%
Latvia	97%	98%	100%	94%	91%	92%
Lithuania	99%	100%	100%	92%	90%	92%
Luxembourg	100%	100%	100%	99%	99%	99%
Macedonia, Rep. of	100%	100%	100%	96%	96%	96%
Moldova, Rep. of	98%	100%	100%	95%	93%	95%
Morocco	98%	99%	100%	95%	93%	94%
Netherlands	70%	93%	100%	97%	67%	90%
New Zealand	92%	99%	100%	96%	88%	95%
Norway	68%	82%	100%	87%	58%	71%
Poland	99%	100%	100%	95%	94%	95%
Qatar	100%	100%	100%	94%	94%	94%
Romania	99%	99%	100%	98%	97%	97%
Russian Federation	100%	100%	100%	97%	97%	97%
Scotland	69%	87%	100%	94%	65%	81%
Singapore	100%	100%	100%	95%	95%	95%
Slovak Republic	93%	98%	100%	96%	89%	94%
Slovenia	93%	97%	100%	96%	90%	93%
South Africa	94%	96%	100%	92%	86%	88%
Spain	99%	100%	100%	97%	95%	97%
Sweden	100%	100%	100%	96%	96%	96%
Trinidad and Tobago	99%	99%	100%	95%	94%	94%
United States	57%	86%	100%	96%	54%	82%

Exhibit 9.9 Trends in PIRLS Student Populations

Country	Years of Formal Schooling		Average Age		Human Development Index		Overall Exclusion Rate	
	2006	2001	2006	2001	2006[1]	2001[2]	2006	2001
Bulgaria	4	4	10.9	10.9	0.816	0.772	6.4%	2.7%
Canada, Ontario	4	4	9.8	9.9	0.950	0.936	8.3%	6.6%
Canada, Quebec	4	4	10.1	10.2	0.950	0.936	3.6%	3.3%
England	5	5	10.3	10.2	0.940	0.923	2.4%	5.7%
France	4	4	10.0	10.1	0.942	0.924	3.8%	5.3%
Germany	4	4	10.5	10.5	0.932	0.921	0.7%	1.8%
Hong Kong SAR	4	4	10.0	10.2	0.927	0.880	3.9%	2.8%
Hungary	4	4	10.7	10.7	0.869	0.829	3.7%	2.1%
Iceland	4	4	9.8	9.7	0.960	0.932	3.8%	3.1%
Iran	4	4	10.2	10.4	0.746	0.714	3.8%	0.5%
Israel	4	4	10.1	10.0	0.927	0.893	22.5%	22.4%
Italy	4	4	9.7	9.8	0.940	0.909	5.3%	2.9%
Kuwait	4	4	9.8	9.9	0.871	0.818	0.3%	0.0%
Latvia	4	4	11.0	11.0	0.845	0.791	4.7%	4.6%
Lithuania	4	4	10.7	10.9	0.857	0.803	5.1%	3.8%
Macedonia	4	4	10.6	10.7	0.796	0.766	4.9%	4.2%
Moldova	4	4	10.9	10.8	0.694	0.699	0.6%	0.5%
Morocco	4	4	10.8	11.2	0.640	0.596	1.1%	1.0%
Netherlands	4	4	10.3	10.3	0.947	0.931	3.6%	3.7%
New Zealand	5	5	10.0	10.1	0.936	0.913	5.3%	3.2%
Norway	4	4	9.8	10.0	0.965	0.939	3.8%	2.8%
Romania	4	4	10.9	11.1	0.805	0.772	2.4%	4.5%
Russian Federation	4	3 or 4	10.8	10.3	0.797	0.775	7.7%	6.6%
Scotland	5	5	9.9	9.8	0.940	0.923	2.3%	4.7%
Singapore	4	4	10.4	10.1	0.916	0.876	0.9%	1.4%
Slovak Republic	4	4	10.4	10.3	0.856	0.831	3.6%	2.0%
Slovenia	3 or 4	3	9.9	9.8	0.910	0.874	0.8%	0.3%
Sweden	4	4	10.9	10.8	0.951	0.936	3.9%	5.0%
United States	4	4	10.1	10.2	0.948	0.934	5.9%	5.3%

1 Taken from the United Nations Development Programme's *Human Development Report 2006*, p. 283-286

2 Taken from the United Nations Development Programme's *Human Development Report 2001*, p. 141-144

References

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