Appendix 3A: Sampling Schools

TIMSS employs random-start fixed-interval systematic sampling to draw the school sample, with each school selected with probability proportional to its size (PPS).

To sample schools using the PPS systematic sampling method, the schools from each explicit stratum in the sampling frame are sorted by implicit stratification variables and by their measure of size (MOS), as shown in the example in Exhibit 3.6. The MOS is accumulated from school to school and the running total (the Cumulative MOS) is listed next to each school. The cumulative MOS across the entire stratum (the Total MOS) is a measure of the size of the school population in the stratum (59,614 students in the example).

First Step: Compute the Sampling Interval

Dividing the Total MOS by the number of schools required for the sample (50 in the example) gives the sampling interval.

- **59,614 ÷ 50 = 1,192.2800**

Second Step: Generate a Random Start

Generate a random number from a uniform (0,1) distribution and multiply it by the sampling interval. The school whose cumulative MOS contains the resulting number is the first school in the sample.

- **0.5481 × 1,192.2800 = 653.4887**

- **School 1718**, with cumulative **MOS** of **690**, is the first school in the sample.

Third Step: Identify the Next School in the Sample (repeat until all schools have been sampled)

- Add the sampling interval to the number computed in the previous step.

- **653.4887 + 1,192.2800 = 1,845.7687**

- **School 0067,** with cumulative **MOS** of **1,855**, is the second school in the sample.

- Repeat until all schools have been sampled. For example, to identify the third school:

- **1,845.7687 + 1,192.2800 = 3,038.0487**

- **School 0333**, with cumulative **MOS** of **3,038**, is the third school in the sample.

Fourth Step: Identify Replacement Schools

Two replacement schools are identified for each sampled school. The first replacement (R1) is the school that immediately follows the sampled school in the sampling frame, and the second replacement (R2) the school that immediately precedes the sampled school.

Exhibit 3.6: Example of PPS Systematic Sampling—Schools

Sampling Parameters	
Total Number of Schools:	2,119
Total Measure of Size:	59,614
School Sample Size:	50
Sampling Interval:	1,192.2800
Random Start:	653.4887

First Step
Compute the Sampling Interval:
59,6914 ÷ 50 = 1,192.2800

Second Step
Generate a random start:
0.5481 × 1,192.2800 = 653.4887

Third Step (repeat until complete)
Compute the next selection numbers:
653.4887 + 1,192.2800 = 1,845.7687
1,845.7687 + 1,192.2800 = 3,038.0487

Fourth Step
Identify Replacement Schools
(R1, R2)

School Identifier	School MOS	Cumulative MOS	Sampled Schools
0829	110	110	
0552	101	211	
1802	98	309	
1288	98	407	
2043	95	502	
0974	94	596	R2
1718	94	690	✓
1807	93	783	R1
0457	93	876	
0244	93	969	
1817	91	1,060	
1741	90	1,150	
1652	89	1,239	
0121	89	1,328	
0309	89	1,417	
0032	89	1,506	
0021	89	1,595	
0609	88	1,683	
0399	86	1,769	R2
0067	86	1,855	✓
0202	86	1,941	R1
0063	86	2,027	
1467	86	2,113	
1381	86	2,199	
1043	84	2,283	
1318	84	2,367	
0659	84	2,451	
0612	83	2,534	
1696	82	2,616	
0867	82	2,698	
0537	81	2,779	
1794	80	2,859	
0695	80	2,939	
0031	80	3,019	R2
0333	79	3,098	✓
0051	79	3,177	R1
0384	79	3,256	
1361	79	3,335	
1189	79	3,414	
0731	78	3,492	
0634	78	3,570	
1230	77	3,647	