WORLD BANK GROUP

THAILAND PUBLIC REVENUE AND SPENDING ASSESSMENT

PROMOTING AN INCLUSIVE AND SUSTAINABLE FUTURE

JUNE 2023

CHAPTER 5
SPENDING FOR IMPROVED STUDENT LEARNING

Chapter 5: Spending for Improved Student Learning

5.1 Introduction

211. This chapter identifies spending inefficiencies that explain why higher levels of education spending in Thailand have not translated into improved learning outcomes. It begins by providing an overview of education spending trends. Section 5.2 then assesses the country's performance in terms of education access and per-pupil spending by benchmarking Thailand against international peers at similar stage of development. The relationships between public expenditure and human capital accumulation, as measured by PISA 2018 test scores, are analyzed in Section 5.3. The results indicate that Thailand's spending efficiency has deteriorated as the increase in spending over the last fifteen years has not translated into any improvement in student learning. The worsening spending inefficiency was further compounded by widening inequalities in student achievement. Section 5.4 then goes on to identify the root causes of the high and rising spending inefficiency, as well as investigate how equitably educational resources have been allocated among the schools. It finds that the bulk of the inefficiency was concentrated in the primary level, resulting mainly from the existence of a vast network of small schools with tiny classes. Even though per-student costs for these small schools were much greater than those for larger schools, they were chronically short of teachers and other key educational inputs. A recommendation to consolidate the school network is proposed in order to create larger, better resourced schools which do not face such shortages.[124]

212. The chapter ends with an analysis of various education financing scenarios that would be consistent with improved learning outcomes. Three different scenarios are analyzed in the section. First is the 'Baseline' scenario, which reflects business-as-usual management of the education sector and in which the economy's long-run growth path is assumed to follow the low-growth potential level. The second scenario, called 'School network reorganization,' is the same as the baseline scenario, except that the Government will begin to implement a 15-year program to downsize Thailand's vast network of mainly small primary schools in 2023. Finally, the 'High-growth' scenario assumes that the Government will initiate wide-ranging reforms to improve student learning. These reforms would encompass reorganizing the school network (as in the second scenario), as well as substantially raising public per-student spending at the pre-primary, secondary, and tertiary levels to be in-line with international peers. In this scenario, learning outcomes improve significantly, shifting Thailand's potential growth rate upwards.[125]

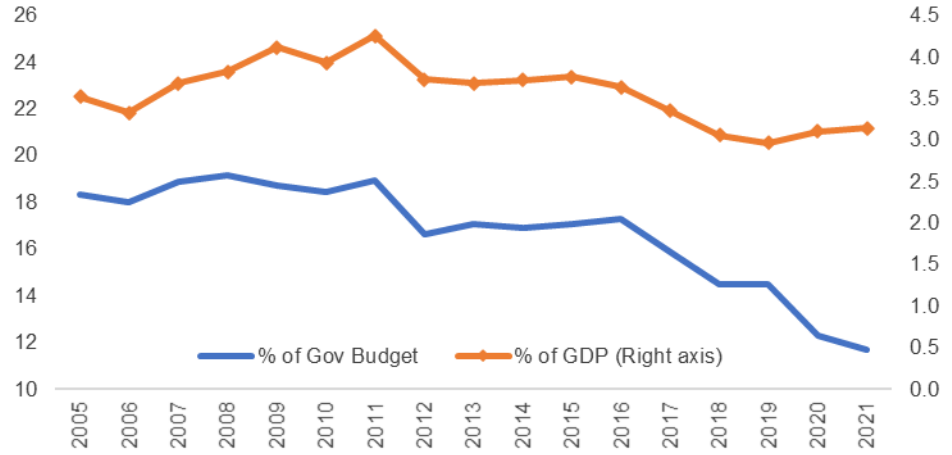
5.2 Education spending trends in Thailand

213. Public spending on education in 2019 amounted to 3 percent of Thailand's gross domestic product (GDP). This has declined substantially from the 3.7 percent registered half a decade earlier (Figure 5-1). Compared to international peers, Thailand's education spending in 2019 was well below the expected level (4.4 percent) given the country's stage of economic development. (Figure 5-2). Nevertheless, there is very weak correlation between a country's GDP per capita and this indicator of public education expenditure. More advanced economies such as Singapore and Macao SAR, China spent less than 3 percent, while Japan and Hong Kong SAR, China spent around 3.2 and 3.3 percent of their GDP on education.

[124] The analytical framework used in this section follows those employed in World Bank (2018) and World Bank (2020). However, while the two previous reports used school level data from 2016 and 2019, this study updates the analysis by using the latest available 2020 school level data. Nevertheless, the key conclusions reached are similar in all studies.

[125] A central assumption underlying the High-growth scenario is that additional public educational resources are used effectively to improve student learning. Some recent empirical evidence on ways in which Thailand could reform its education system in order to raise student learning to the level consistent with the high-growth scenario are provided in Annex 5-3.

Figure 5-1: Government expenditure on education as percentage of GDP and total government budget (2005 – 2021)



Source: Bureau of the Budget, Ministry of Finance, Thailand.

214. As of 2019, Thailand has allocated around 14.5 percent of total public spending to the sector. This has again fallen sharply from the 16.9 percent level seen in 2014. Thailand's 14.5 percent allocation in 2019 was slightly below its peers at a similar stage of economic development (Figure 5-3). Given the country's GDP per capita of US$ 6,503 (in constant US$2010), it was expected that Thailand would allocate around 14.7 percent of its total public spending to the education sector. But once again, the level of a country's GDP per capita is a poor predictor of education spending as a percentage of total government expenditure.

215. Education expenditure fell further in 2020 and 2021 due to the COVID-19 pandemic. Government expenditure on education declined further to 12.3 percent of total public spending in 2020 and then to just 11.7 percent in 2021 as a result of the COVID-19 pandemic.

Figure 5-2: Government expenditure on education as percentage of GDP

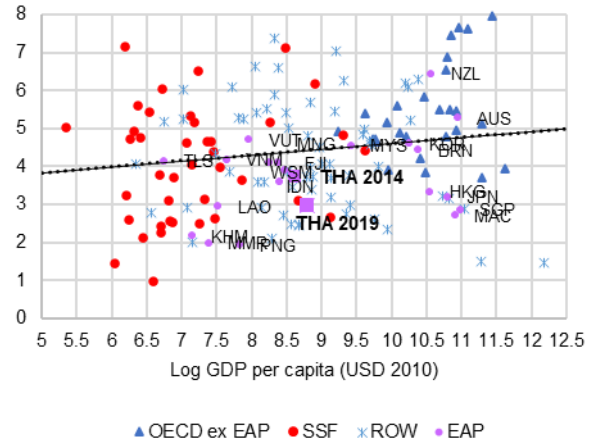
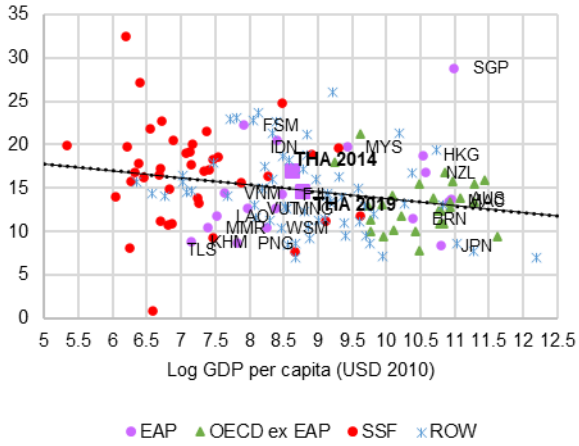


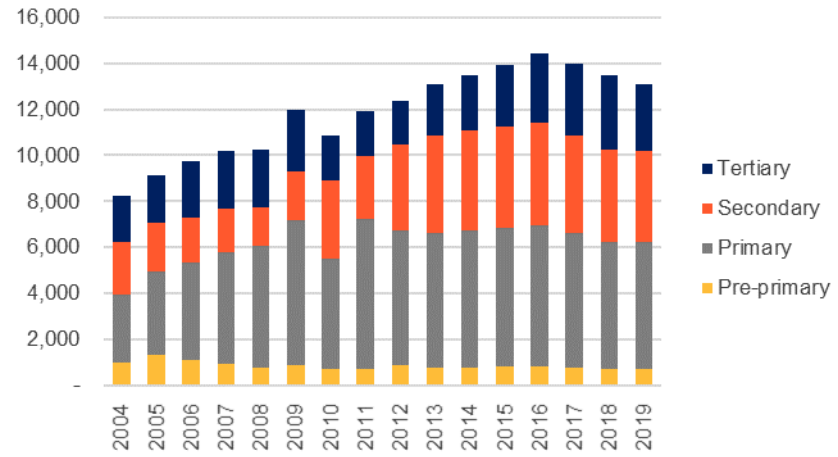
Figure 5-3: Expenditure on education as percentage of total government expenditure



Source: World Development Indicators and World Bank EdStats

216. In real US$ terms, Thailand's total public spending on education increased significantly up until 2016, after which it declined. Real public expenditure on education increased by 75 percent between 2004 and 2016. However, spending has gradually decreased since then. Primary education was the biggest cost driver during the 2004-2011 period, while secondary education took over thereafter (Figure 5-4).

Figure 5-4: Total expenditure by level of education (constant US$2010, million)



Source: World Bank Staff estimates based on Education Statistics from the Office of the Permanent Secretary, Ministry of Education, Thailand.

217. This increase in public education expenditure occurred despite a continuous decline in student numbers. Due to Thailand's rapidly ageing demographics, the number of primary students fell by almost 1.2 million, or as much as 20 percent, from 2004 to 2019. Over the same period, the number of secondary students declined by14 percent (734,800 students). On the other hand, the number of pre-primary and tertiary students have remained relatively stable over the observed period (see Figure 5-5 and Figure 5-6).

Figure 5-5: Number of primary and secondary students (2008 – 2019)

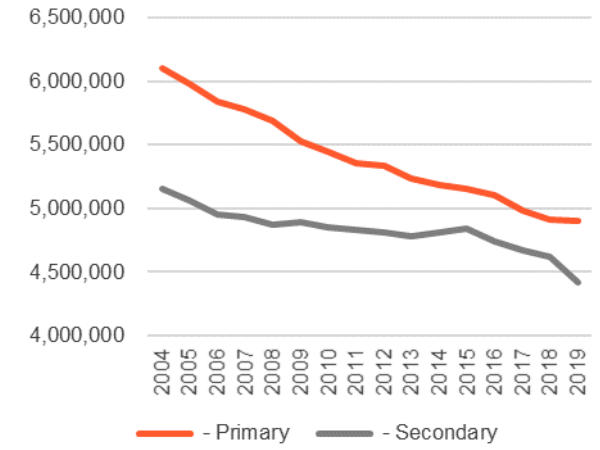
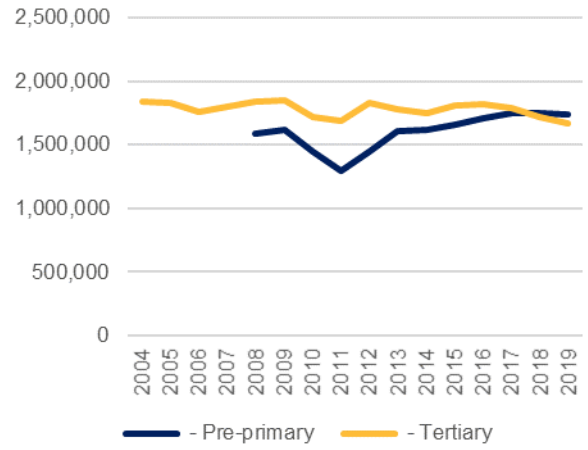


Figure 5-6: Number of pre-primary and tertiary students (2008 – 2019)



Source: World Bank Staff estimates based on data from the Office of the Permanent Secretary, MOE, Thailand.

218. Focusing on basic education schools under the Office of the Basic Education Commission's (OBEC),[126] we observe that the inflation-adjusted total budget increased by nearly 30 percent from 2010 to 2016 even though the total number of students declined from 7.71 to 6.86 million (or around 11 percent). Despite the fall in the number of students, the total number of teachers (including principals and administrators) increased from 404,816 to 451,038 (11.4 percent increase).[127] Personnel salary was the most important driver of the rise in the budget, accounting for as much as

[126] The majority of general basic education students (from pre-primary to secondary) are enrolled in schools under OBEC. As of 2019, around 85 percent of students enrolled in the public school system were in OBEC schools. Private schools, on the other hand, accounted for around 29 percent of total basic education student enrolment.

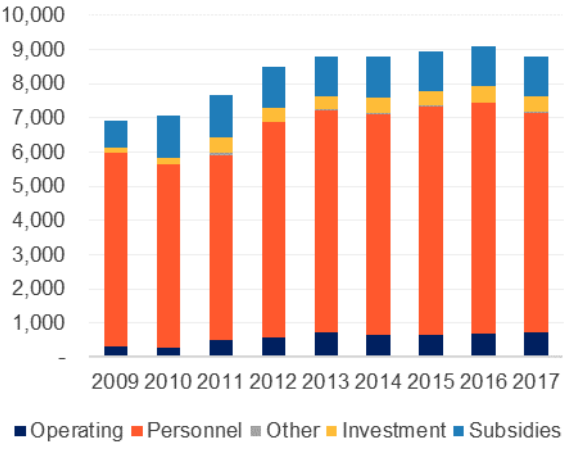
[127] The latest 2020 school-level data indicate that the number of students in OBEC schools has fallen further to 6.58 million, while the total number of teachers has risen to 475,024. We will show in later sections that even though the pupil teacher ratio has fallen to as low as 13.85:1, many classrooms in OBEC schools are still chronically short of teachers.

69 percent of the total increase over 2010 to 2016. Personnel salary made up around 74 percent of basic education budget (see Figure 5-7).

219. As a result, annual per-student public spending has risen substantially. Figure 5-8 shows that real annual per-student public spending at the primary level increased by as much as 133 percent from 2004 to 2019. Secondary and tertiary per-student spending also rose substantially by 83 and 78 percent respectively. However, at the pre-primary level, spending per student has remained relatively unchanged throughout the entire observed period.

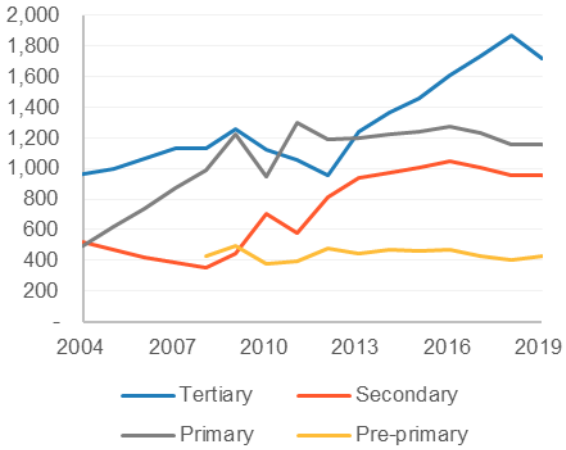
220. Unusually, spending per primary student is higher than spending per secondary student. Considering the fact that secondary schools require more specialist subject teachers compared to primary schools, we would expect that per-student spending at the secondary level would be higher. Instead, however, the observed annual expenditure of US$ 1,157 per primary student was around 21 percent higher than annual spending per seconary student in 2019. This issue is explored in more detail later in this chapter.

Figure 5-7: Basic Education Budget by Category (in constant US$ 2010 THB) – OBEC



Source: Ministry of Education, Thailand

Figure 5-8: Expenditure per student by level of education (constant US$2010)



Source: World Bank Staff estimates based on data from the Office of the Permanent Secretary, MOE, Thailand.

5.3 Benchmarking Thailand's education spending performance

221. Thailand has made substantial progress in improving access to pre-primary education. The pre-primary net enrolment rate (for 3–5-year-olds) stood at almost 80 percent in 2019, up considerably from around 60 percent a decade earlier, as a result of government policy to expand free access. The observed net enrolment rate was about 20 percent higher than expected given Thailand's level of GDP per capita (see Figure 5-9).

Figure 5-9: Pre-primary net enrolment rate

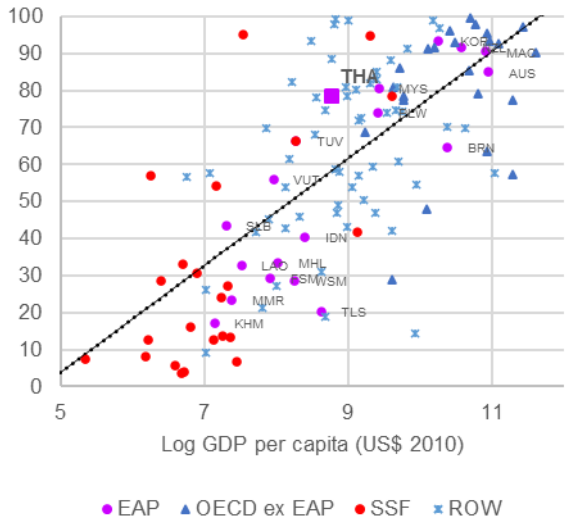
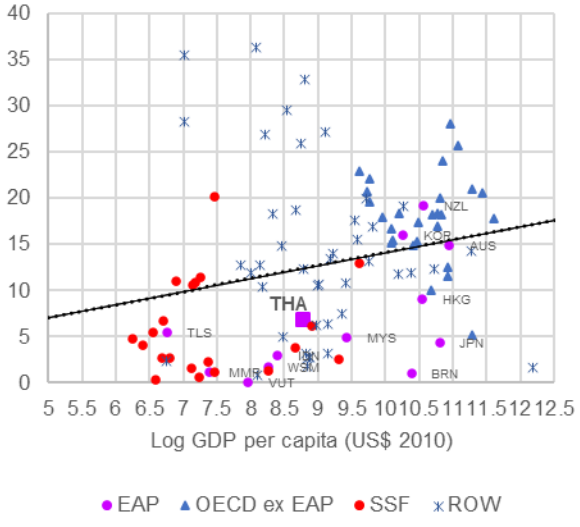


Figure 5-10: Government expenditure per pre-primary student as percentage of GDP per capita



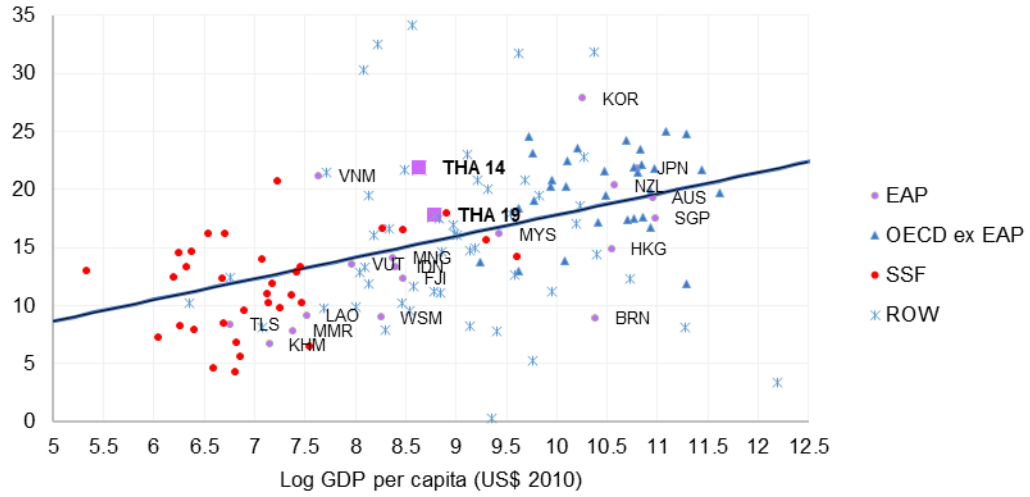
Source: World Development Indicators and World Bank EdStats

222. But Thailand's per-student public spending at the pre-primary level continues to be much lower than its peers and the quality of pre-primary education remains a concern. The country's level of per-student public expenditure in 2019 was as much as 47 percent below its international peers at a similar developmental stage (Figure 5-10). As we have seen in Figure 5-8, real per-student spending at the pre-primary level has remained roughly unchanged over the last decade. The latest Multiple Indicator Cluster Survey 2019 data (MICS6)[128] also revealed that only 61 percent of Thai children aged 3-5 were developmentally on track in the literacy-numeracy domain (UNICEF, 2020). In order to boost the quality of pre-primary education, the government is currently seeking to raise teacher qualifications, improve the curriculum, and create a standardized evaluation system for all early childhood development centers (OECD, 2018). These reforms are likely to result in material increases in spending in the sector.

223. In primary education, Thailand was spending significantly more per student than expected given its GDP per capita. Thailand has achieved universal primary education with primary gross and net enrolment rates hovering around 103 and 98 percent respectively since early 2000s. In regard to public expenditure, at Thailand's level of economic development, it is expected that the country would spend around 15.6 percent of GDP per capita per primary student. However, the country was spending almost 18 percent of GDP per capita per student in 2019. In 2014 this proportion was even greater, at 21.9 percent, and it put Thailand among the highest spenders in the world in that year (Figure 5-11). As will be shown in upcoming sections, most inefficiencies in Thailand's education spending can be traced to the primary sector.

[128] MICS6 is the largest national survey on children and women. Launched in October 2019, the survey was the first to include a questionnaire directed at children to assess foundational learning skills and will form key evidence for policy planning, advocacy, and monitoring on child related issues (MICS6 Report).

Figure 5-11: Government expenditure per primary student as percentage of GDP per capita



Source: World Development Indicators and World Bank EdStats

224. Both secondary and tertiary gross enrolment ratios were slightly below expected levels. As shown in Figure 5-12, compared to international peers at similar stage of development, Thailand's secondary gross enrolment rate of 85.6 percent in 2019 was slightly below the expected rate of 90 percent. Similarly, the country's tertiary gross enrolment ratio of 44.8 percent was slightly below the 46.8 percent expected rate given Thailand's GDP per capita (Figure 5-13).

Figure 5-12: Secondary gross enrolment rate

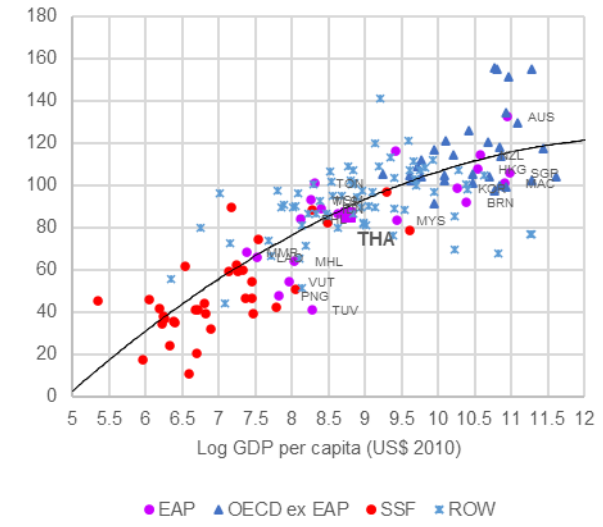
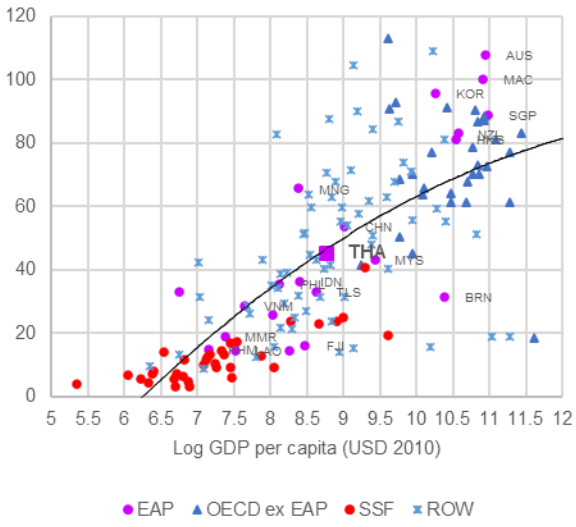


Figure 5-13: Tertiary gross enrolment rate



Source: World Development Indicators and World Bank EdStats

225. Thailand's per-student public spending at the secondary level in 2019 was substantially lower than the international benchmark. Given Thailand's GDP per capita, the country's per-student spending at the secondary level was around 25 percent below the world regression line shown in Figure 5-14. As already mentioned, expenditure per secondary student in 2019, at 14.6 percent of GDP per capita, was even lower than the 17.8 percent recorded by the primary education sector. Considering the fact that secondary schools generally require more specialist subject teachers than primary schools, it is reasonable to expect that per-student spending at the secondary level would be higher. However, the exact opposite is true for Thailand. As can be seen from Figure 5-8, per-student public spending at the primary level has been consistently higher than the secondary level throughout the last 15 years.

226. At the tertiary level, Thailand's per-student public expenditure was slightly below the level expected given the country's stage of economic development. Government expenditure per tertiary student in 2019 amounted to 26.4 percent of GDP per capita, which was slightly lower than the estimated 27.8 percent international benchmark given the country's income per capita (see Figure 5-15).

Figure 5-14: Government expenditure per secondary student as % of GDP per capita

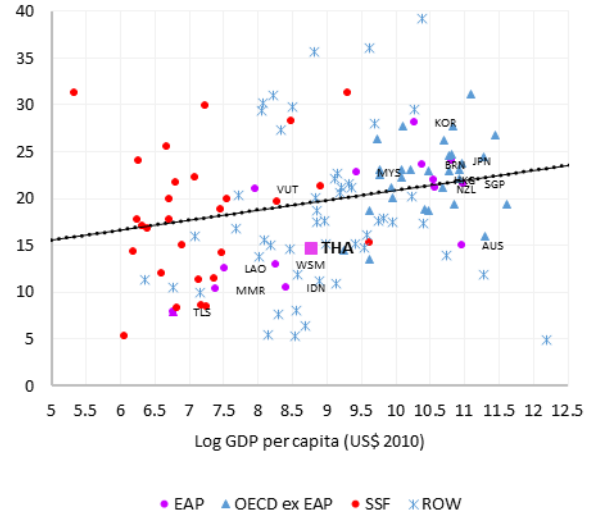
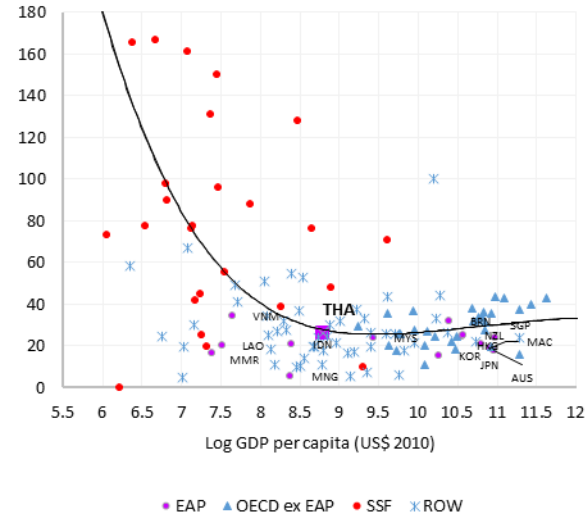
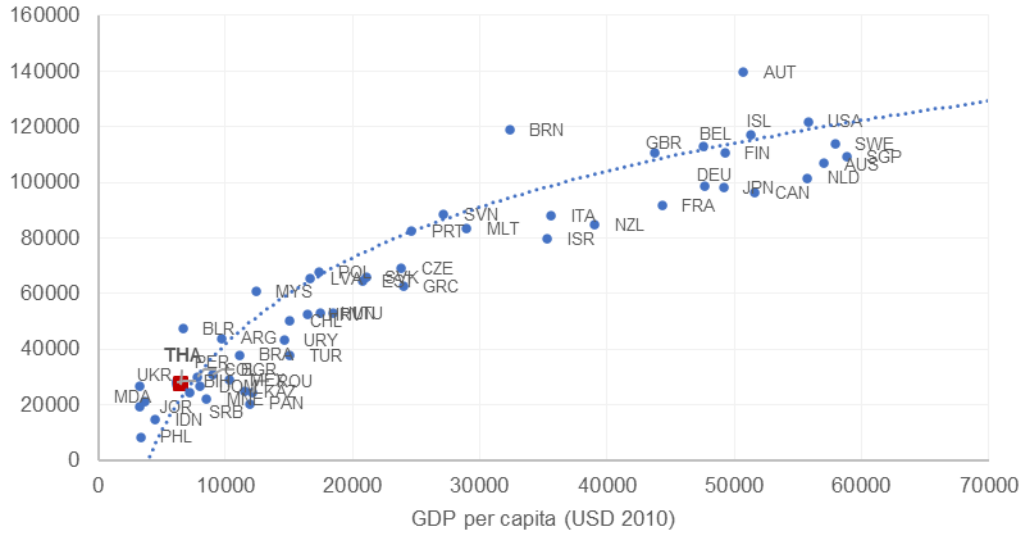


Figure 5-15: Government expenditure per tertiary student as % of GDP per capita



Source: World Development Indicators and World Bank EdStats

Figure 5-16: Cumulative expenditure per student from Grade 1 to Grade 9 (PPP US$)



Source: OECD PISA 2018 database and World Development Indicators

227. In terms of cumulative government expenditure per student from Grade 1 to Grade 9, Thailand's spending level of US$ 27,271 (after accounting for purchasing power parities) is one of the lowest observed among the PISA 2018-participating countries (Figure 5-16). Nevertheless, Thailand spent nearly 22 percent more than the level expected given its per capita income. Clearly, the higher than expected cumulative per-student spending was driven by the six years of primary education, where Thailand was spending significantly more per student than expected.

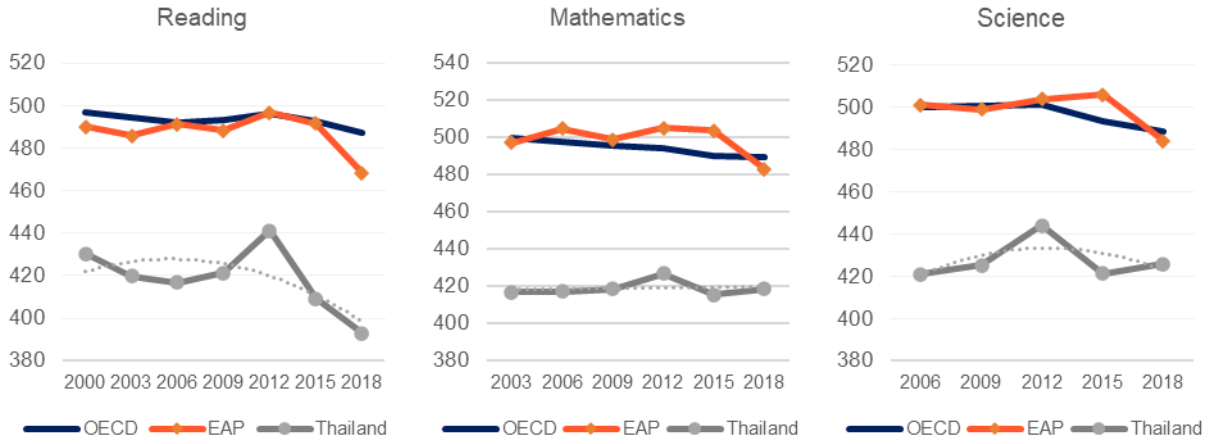
228. The benchmarking analysis in this section revealed that, except for primary education, per-student public expenditure in Thailand has generally been lower than its international peers across all levels of education. Per-

student public spending at the pre-primary and secondary levels in particular, were as much as 47 and 25 percent below international peers at similar stage of development respectively. Per-student public expenditure at the tertiary level, on the other hand, was only slightly below the international benchmark.

5.4 Public educational inputs and human capital development

229. Despite the massive increase in spending discussed in the previous section, Thai students' performance in the PISA assessments remained stagnant from PISA 2000 to PISA 2018. In PISA 2018, Thailand ranked 68th in reading out of the 79 PISA-participating countries and economies (59th in mathematics, and 55th in science), ahead of only Indonesia and the Philippines in EAP. Furthermore, all the trends have moved in the wrong direction. Thailand's reading performance shows an increasingly negative trajectory, while scores in math and science have stagnated (see Figure 5-17).

Figure 5-17: Trends in Student Learning Outcomes in the Three PISA Domains



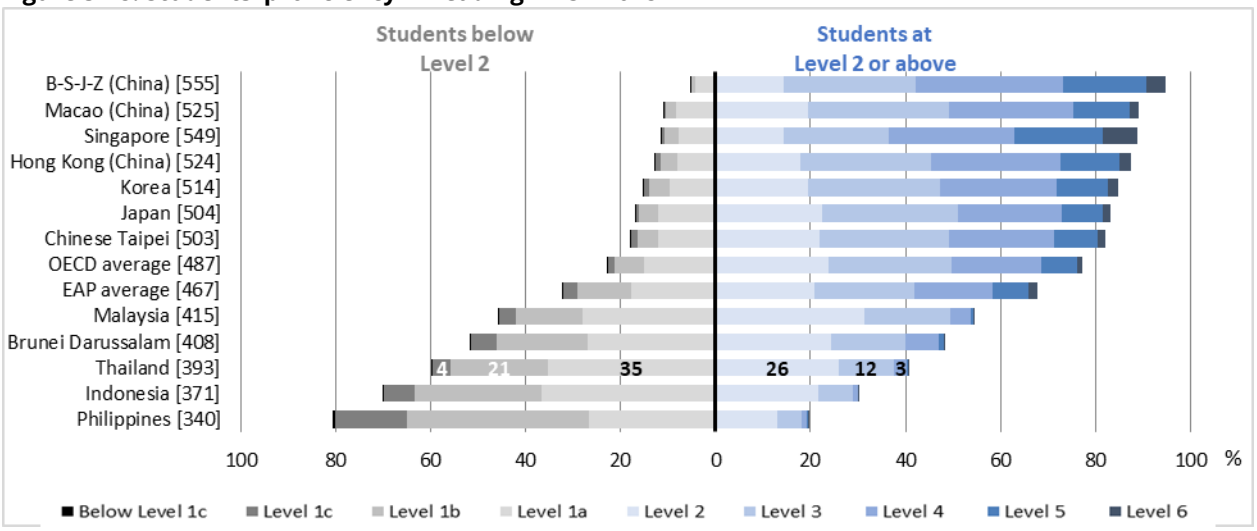
Source: OECD PISA 2000-2018 database.

230. In 2018, around 60 percent of students scored below the minimum proficiency level (Level 2) in reading.[129] In other words, they were functionally illiterate in spite of their having attended school for nearly nine years. At the other end of the spectrum, while over a quarter of students in Singapore, 12.2 percent in Macao SAR China, 13.5 percent in Hong Kong SAR China, 3.5 percent in Vietnam, and 12 percent in Korea attained level 5 or higher (high proficiency) in reading, only 0.07 percent of Thai students managed to do so (Figure 5-18). The gaps to these better-performing countries were even greater in the mathematics domain.

231. Substantial increases in spending over the last fifteen years did not yield any improvement in results. Figure 5-19 examines the relationship between countries' cumulative spending per student from Grade 1 – 9 and mean student performance in reading. Average reading scores and per student spending are strongly and positively associated (with a coefficient of determination or R-squared of 0.49). It is important to note from Figure 5-19 that Thailand's current per student public expenditure is around the stage where increases in spending should lead to relatively large gains in student learning outcomes. However, as also discussed in the previous section (see Figure 5-8), substantial increases in spending over the last one and a half decades did not yield any improvement in results. In fact, Thai students' performance across the three domains have either stagnated or deteriorated over the period (compare 'Thailand 2003' and 'Thailand 2018' in Figure 5-19).

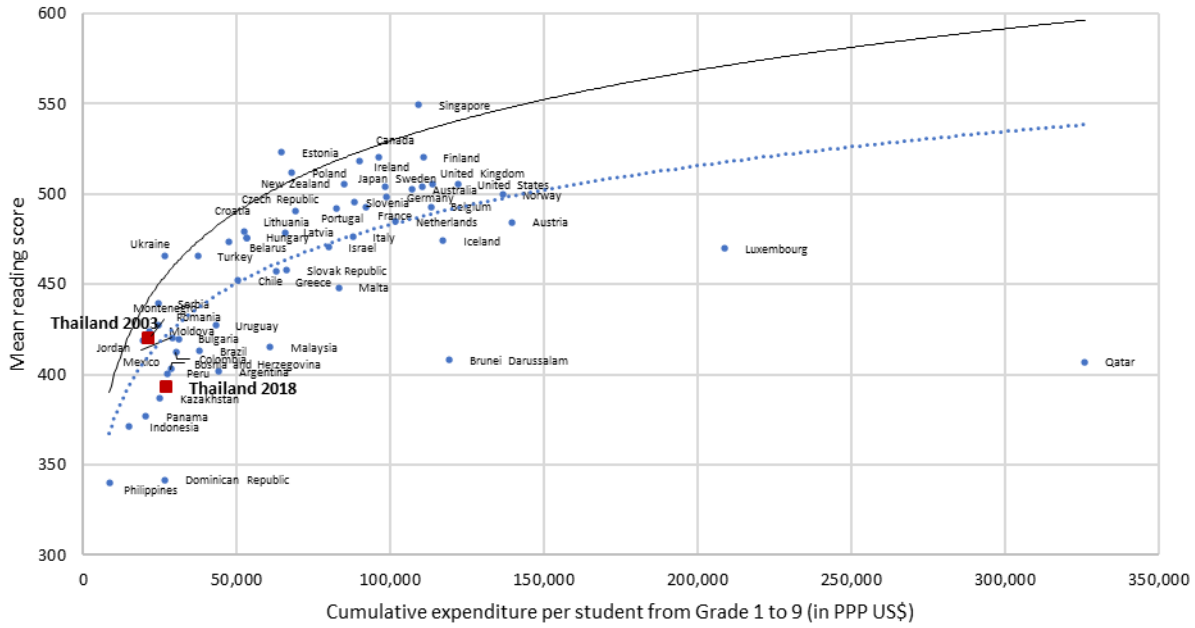
[129] More than half (53 percent) were unable to attain the minimum proficiency level in math, while 44 percent failed to reach basic proficiency in science.

Figure 5-18: Students' proficiency in reading - PISA 2018



Notes: Mean reading scores for each country are indicated within brackets [ ]. Source: OECD PISA 2018 database.

Figure 5-19: Mean reading performance and cumulative spending per student in US$ PPP



Source: OECD PISA 2018 database.

Note: Dark solid line is the frontier; Blue dotted line is the regression trend line.

232. Given Thailand's level of per student spending, the country could achieve much better learning outcomes in reading. Regression analysis of the relationship between PISA 2018 reading score and cumulative spending per student (dotted line in Figure 5-19) suggests that Thai students' average reading score of 393 was 29 points below the expected level of 422.[130] This means that Thai students were almost a full year[131] behind their counterparts in the 'average' country which spent similar amount per student as Thailand. Applying Stochastic Frontier Analysis (SFA) on the same variables, we

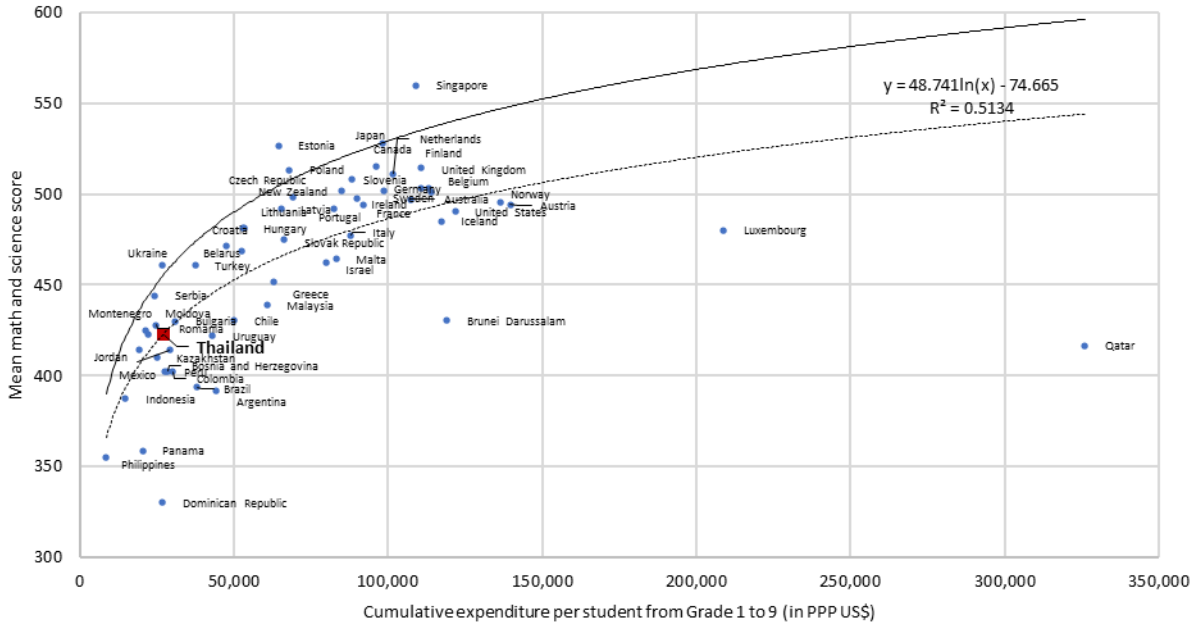
[130] A similar analysis conducted using countries' GDP per capita yielded comparable results. Specifically, it estimated that Thailand's performance was 22.5 points below expected level.

[131] PISA scores are scaled so that the OECD average in each domain (mathematics, reading, and science) is 500 and the standard deviation is 100. This is true only for the initial PISA cycle when the scale was first introduced, though, subsequent cycles are linked to the previous cycles through item response theory (IRT) linking methods. A score of 30 points is equivalent to one year's worth of learning (OECD PISA).

estimated that at Thailand's level of cumulative spending per student (US$ 27,271), the country's theoretical maximum student achievement in reading was 456, which is 63 points higher than the 393 the country managed (the frontier is given by the solid line in Figure 5-19). Other countries which spent less, such as Jordan (US$ 19,363), Romania (US$ 24,608), and Ukraine (US$ 26,647) did much better and achieved scores of 419, 428, and 466 respectively.

233. Regarding math and science, however, Thai students' average performance across the two subjects was at the expected level given the country's per student spending. In 2018, the country's average score in the two subjects was 422, which is approximately on the world regression line (dotted line graph in Figure 5-20). But SFA suggests that at Thailand's level of spending, student math and science scores could potentially be as high as 456 (the frontier is given by the solid line in Figure 5-20).

Figure 5-20: Mean math and science performance and cumulative spending per student in US$ PPP



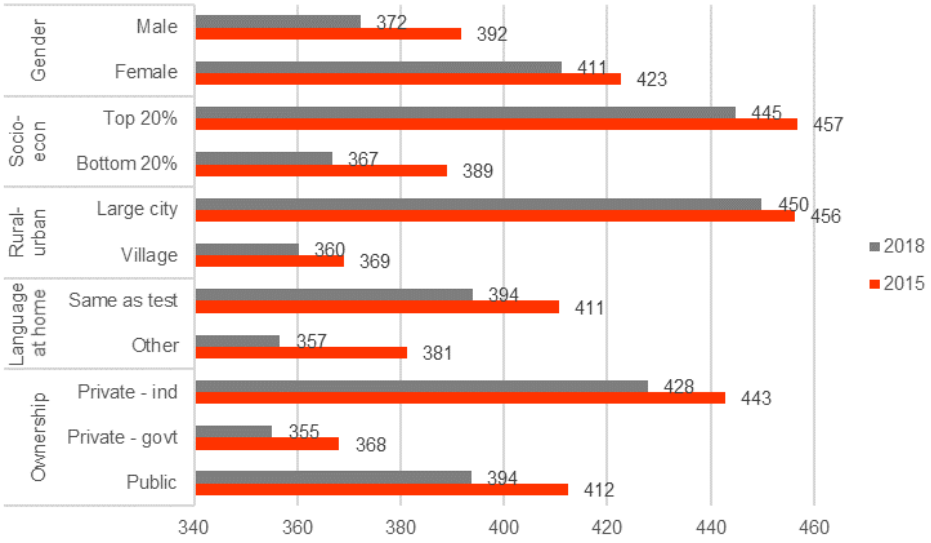
Source: OECD PISA 2018 database.

234. The COVID-19 pandemic could result in a further loss of 1.22 learning adjusted years of schooling for Thailand. Learning time has been lost due to lengthy nationwide school closures. A recent World Bank (2021) report estimated that COVID-19 could result in a loss of 1.22 years of schooling (adjusted for quality), in addition to the learning crisis underway before the pandemic. Moreover, the loss of learning was unlikely to be uniformly distributed across socioeconomic groups, as students with lower access to remote learning resources were more adversely affected (World Bank, 2020).

235. Inequality in student learning outcomes has also widened across almost all dimensions over the 2015-2018 period. Figure 5-21 shows that the gap in reading performance between female and male students has widened from 31 points in 2015 to 39 points in 2018 (gap widened from 1 to 1.3 years). Similarly, the performance gap between students from the top 20 percent in the socioeconomic status index and the bottom 20 percent has widened from 68 to 78 points (from 2.3 to 2.6 years), while the gap between those students who spoke the language of the test at home and those who spoke a different language has widened from 29 to 37 points (from 1 to 1.2 years) over the same period. The already very wide urban-rural performance gap has expanded further from 87 to 90 points (from 2.9 to 3 years). Lastly, the gap from Public to Private independent schools has widened from 30 to 34 points (from 1 to 1.1 years) over the same period, while the gap from Private government-dependent to Private independent schools has narrowed slightly from 75 to 73 points

(from 2.5 to 2.4 years).[132] Similarly, almost all measures of inequality have also widened in mathematics and science over the period from 2015 to 2018 (see World Bank (2020) for more detailed analysis of PISA results).

Figure 5-21: Learning outcome inequality for Reading



Source: OECD PISA 2018 database.

5.5 Equity in educational resource allocation

236. This chapter has shown that despite increases in real per-student spending, learning outcomes (as reflected in test results) have worsened. The objective of this section is to identify the root causes of the spending inefficiency in the basic education sector, investigate how equitably educational resources are allocated among Thai schools, and propose recommendations on reforms to improve spending efficiency and equity. The analytical framework used in this section follows those employed in World Bank (2018) and World Bank (2020). However, while the two previous reports used school level data from 2016 and 2019, this study updates the analysis by using the latest available 2020 school level data. Nevertheless, the conclusions reached are similar across all studies.

Resources invested in education

Human resources

237. Of the 29,313 schools nationwide under OBEC's supervision[133] in 2020, as many as 16,596 (57 percent) are considered small. In this report, a school is defined as "Small" if the enrolment size is less than 120 for "Primary" schools, less than 120 for "Secondary" schools, less than 180 for "Opportunity expansion" schools, and less than 240 for "Complete" schools.[134] From Table 5-1 we can see that 1.25 million students (or 19 percent of students) were enrolled in these small

[132] Among the different school ownership types, public schools and private government-dependent schools tended to have higher concentrations of socioeconomically disadvantaged students than private independent schools. The socioeconomic composition of the student body in public schools was nearly equal in proportions across all socioeconomic quartiles (measured using PISA Economic, Social, and Cultural Status (ESCS) index). By contrast, private independent schools tended to have a much higher proportion of students from the top ESCS quartile. In private independent schools, more than half (57 percent) belonged to the top quartile, while only 6 percent belonged to the bottom quartile. Among the three school ownership types, students in private government-dependent schools tended to be more socioeconomically disadvantaged than those in private independent schools and, to a lesser extent, those in public schools (World Bank, 2020).

[133] Around 71 percent of Thai students from pre-primary to grade 12 attend these schools (Office of the Education Council, 2018).

[134] A "Primary" school is defined as a school which has grade levels up to G6; An "Opportunity expansion" school is a school which has primary and lower secondary grades (up to G9); A "Secondary" school is a school which has only secondary grades (G7-G12); and A "Complete" school is a school which has all primary and secondary grades (G1-G12).

schools. The average enrolment size for these 16,596 schools was just 75 and the bulk of the small schools were "Primary" and "Opportunity expansion" schools.

Table 5-1: School Characteristics by Enrolment Size Category - 2020

	All schools		Small schools		Non-small schools	
	Number of schools	Share	Number of schools	Share	Number of schools	Share
Kindergarten	15	0.05%	0	0.00%	15	0.12%
Primary	19,979	68.16%	13,660	82.31%	6,319	49.69%
Opportunity	6,855	23.39%	2,753	16.59%	4,102	32.26%
Secondary	2,353	8.03%	174	1.05%	2,179	17.13%
Complete	111	0.38%	9	0.05%	102	0.80%
Total schools	**29,313**	**100.00%**	**16,596**	**100.00%**	**12,717**	**100.00%**
	Average class size	Average # of classes per school	Average class size	Average # of classes per school	Average class size	Average # of classes per school
Preschool	14.05	2.439	8.00	2.176	21.02	2.832
Pri 1	16.95	1.172	9.16	1.000	25.23	1.433
Pri 2	16.78	1.160	9.07	1.000	25.18	1.404
Pri 3	16.14	1.146	8.62	1.000	24.53	1.369
Pri 4	16.52	1.145	8.78	1.000	25.19	1.368
Pri 5	16.67	1.144	8.87	1.000	25.42	1.363
Pri 6	16.89	1.145	9.19	1.000	25.51	1.367
Sec 1	29.59	2.104	12.94	1.002	32.50	2.605
Sec 2	28.86	2.089	12.62	1.005	31.75	2.584
Sec 3	28.68	2.059	12.34	1.005	31.63	2.539
Sec 4	32.11	4.195	11.40	1.162	32.53	4.433
Sec 5	30.40	4.121	9.70	1.158	30.82	4.351
Sec 6	29.40	4.090	8.69	1.180	29.85	4.317
Total classes	335,965		139,941		196,024	
Total teachers	475,024		132,078		342,946	
Teachers req	540,388		199,724		340,664	
Total students	6,579,306		1,252,819		5,326,487	
Avg enrolment	224		75		419	
Actual						
Teacher-to-class	1.414		0.944		1.750	
Pupil-to-teacher	13.850		9.485		15.532	
Required						
Teacher-to-class	1.608		1.427		1.738	
Pupil-to-teacher	12.175		6.273		15.636	

238. Even though the small schools had very low pupil-teacher ratios, they had a very large number of tiny classes and there were not enough teachers to teach in them. Classes in these schools were half empty, especially in the primary grades, where the average class had less than 9 students. Closer investigation reveals that even though the pupil-teacher ratio for these schools was as low as 9.5:1, the schools were chronically understaffed, with anaverage teacher-to-class ratio of less than one. It is therefore impossible for these schools to conduct all classes across different grades at the same time unless multi-grade teaching is employed. The practice could undermine the quality of teaching and learning for these 1.25 million students if teachers were not properly trained and equipped to teach in this manner.

239. The non-small group of 12,717 schools, on the other hand, had much larger classes and higher pupil-teacher ratios. Nevertheless, their teacher-to-class ratio of 1.75 was almost twice as high as that for the small schools. Around 5.33 million students were enrolled in the non-small group of schools, whose enrolment size averaged 419 students. From Table 3.4.1, we can see that these schools were nearly 6 times larger than the small schools in terms of student enrolment, while their classes were nearly 3 times larger. Even with their much higher pupil-teacher ratio of nearly 16:1, their classes were much better-staffed as reflected by their superior teacher-to-class ratio.

240. The observed spending inefficiency and ineffectiveness of teacher (and other educational resource) allocation appears to result from the existence of too many small schools with tiny classes. World Bank (2020) found that the per-student costs for the small schools are several times greater than those for the larger schools. At the same time, teachers and other educational resources are being spread thinly across too many small classes. This means that too many Thai classrooms were faced with chronic teacher shortages, and that their students were disadvantaged as a result. Therefore, the small average class size and low pupil-teacher ratio in many Thai schools do not provide a high quality learning environment, but rather reflect a substantial misallocation of educational resources.

241. If the current distribution and size of schools remain unchanged, there would be a need to recruit, train, and deploy around 65,400 additional teachers to adequately staff all classes in Thai schools. The World Bank teacher demand model[135] (see Annex 2.1 in World Bank (2020) for technical details and underlying assumptions) was employed to quantify the extent of teacher shortage across the entire system. Table 5-1 shows that the total number of teachers in OBEC schools in 2020 was 475,024 but the number of teachers required to staff all existing classes adequately was 540,388. Therefore, if no action is taken to reorganize the vast school network, then it would be necessary to recruit, train, and deploy around 65,400 additional teachers to eliminate the teacher shortage across all 335,965 existing classrooms. The shortage is much more acute among the small schools, where it is estimated that 67,646 additional teachers are needed – a massive increase of 51 percent in their teaching force. Adequately staffing all classes in these small schools under the current situation would require lowering their already very low pupil-teacher ratio of 9.5:1 further to 6.3:1 (see bottom panel of Table 3.4.1), which would in turn lead to a further increase in their already high per-student cost. As shown below, a much more cost-efficient approach would be to reorganize the oversized school network by merging small schools into designated hub schools.

Learning materials, school infrastructure, and other inputs

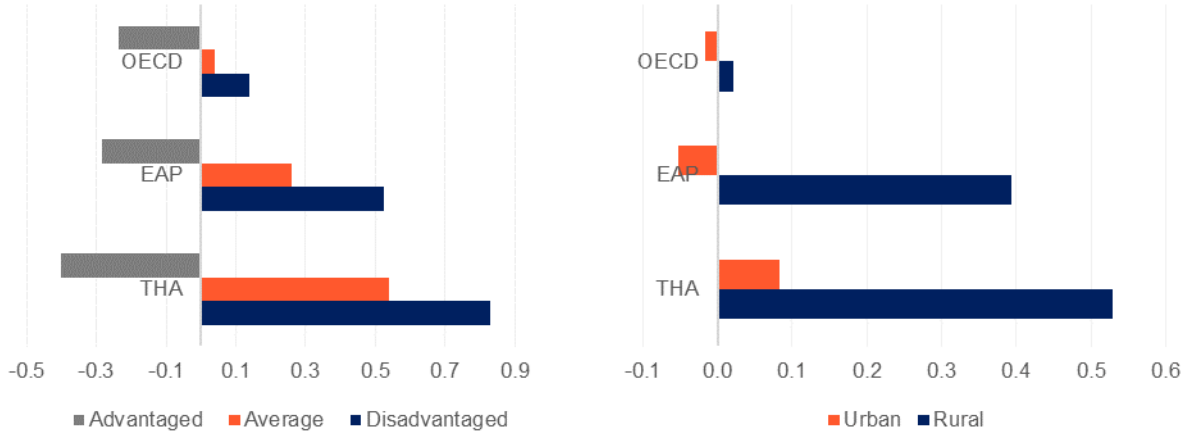
242. School survey results have been used to construct a measure of the availability of educational materials. In the PISA 2018 school survey, school principals were asked whether their schools' capacity to provide instruction was hindered by: "A lack of educational material"[136], "Inadequate or poor-quality educational material", "A lack of physical infrastructure",[137] and "Inadequate or poor-quality physical infrastructure." For each question, the principals had to select one response from "Not at all", "Very little", "To some extent", and "A lot." The answers to these four questions were then given scores and combined to construct a "Shortage of educational material index", which we normalized so that the OECD schools have a mean of zero and a unit variance.

243. The constructed "Shortage of educational material index" shows clearly that Thai schools were more severely hindered in this dimension compared to international peers. The "Shortage of educational material index" was computed for: Advantaged, Average, and Disadvantaged schools;[138] as well as urban and rural schools in the OECD, EAP, and Thailand and the results are presented in Figure 5-22. We observe that Thai schools were more severely hindered in this dimension compared to international peers. Furthermore, schools primarily serving disadvantaged children and schools in the rural areas were generally much more lacking in material resources and physical infrastructure than

[135] The model is our attempt to quantify how many teachers a school should have, taking into account Thailand's curriculum, rules regarding teacher training and teaching loads, and appropriate class sizes.
[136] Including textbooks, IT equipment, library or laboratory material.
[137] Including building, grounds, heating/cooling, lighting and acoustic systems.
[138] Advantaged (Disadvantaged) schools are those schools which were ranked in the top (bottom) 25 percent in terms of average student body Economic, Social, and Cultural Status (ESCS) index. The PISA ESCS index was derived from the following three indices: highest occupational status of parents, highest education level of parents, and home possessions. The index of home possessions comprises all items on the indices of family wealth, cultural possessions, home educational resources, as well as books in the home.

Advantaged schools and schools in the urban areas. The resource allocation inequality can also be seen to be much worse than that observed in the OECD and other EAP countries.

Figure 5-22: Shortage of Educational Material Index – PISA 2018



Source: World Bank staff calculations based on OECD PISA 2018 database.

244. Results from a recent pilot of the World Bank's new Fundamental School Quality Level (FSQL) Standards tool provides further empirical evidence that Disadvantaged schools with weaker school input quality indices were much more likely to be the smaller schools. A new instrument called the Fundamental School Quality Level (FSQL) Standards,[139] conceived by World Bank (2020), was recently tested on 275 schools enrolled in The Kru Rak Thin (KRT) Project[140] during February and March 2022. The results from the survey questionnaire were used to construct 10 FSQL school input quality indices (School leadership and management quality; Student-centric teaching; Classroom management; Teacher development; and six Infrastructure, utility, and service facility indices), which have been normalized to have zero means and unit variances. A K-means clustering algorithm was then used to assign the schools into 3 distinct groups based only on their values on the 10 FSQL school input quality indices. The groups were assigned the labels 'Advantaged', 'Average', and 'Disadvantaged' depending on their input quality index scores. The results from the cluster analysis exercise summarized in Figure 5-23 (and presented in more detail in Annex 5-1) show clearly that the 'Student learning outcome index'[141] for the Disadvantaged group was 0.834 SD below the sample mean, while those of the Average and the Advantaged groups were 0.035 SD below and 0.634 SD above the sample mean respectively.

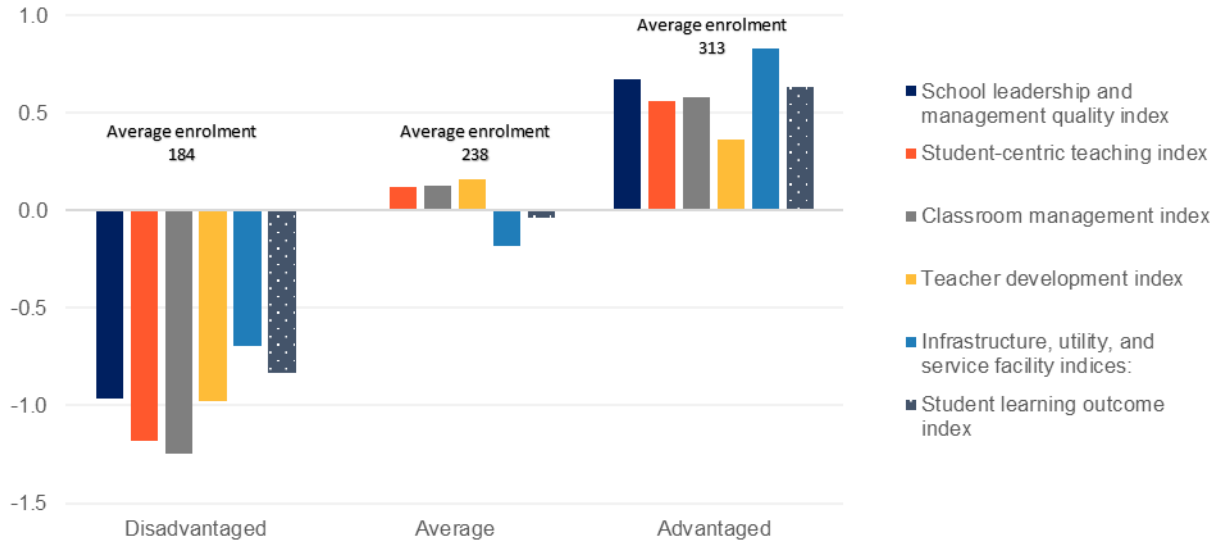
245. Since the Student learning outcome index was not used in classifying the schools, the results of the exercise suggested that the 10 indices of school input quality were good predictors of school performance. The results from the analysis also provide strong empirical evidence that the Disadvantaged schools with lower values of school input quality indices were much more likely to be the smaller schools. Average student enrolments in Disadvantaged, Average, and Advantaged schools were 184, 238, and 313 respectively (see also Table Annex 5-1)

[139] FSQL is a self-scoring tool which schools will fill out. It consists of 63 questions covering 4 domains: i) School Leadership (18 items); ii) Learning Outcomes (5 items); iii) Teacher Quality (11 items); and iv) School Infrastructure and Utility and School Accessibility (29 items). For each question, schools evaluate themselves (based on objective criteria specified by the tool) from a score of 1 ("very poor") to 5 ("very good"). Importantly, the 63 questions are designed to be answered by schools based mainly on information that should be readily available.

[140] The Kru Rak Thin (KRT) Project, initiated by the Equitable Education Fund, is intended to provide an opportunity for poor students in remote areas, who aspire to become teachers, to study at designated public teacher training universities. The project aims to produce quality young teachers, who are recruited locally, in response to the need of schools in remote areas with a focus on reducing inequality and increasing educational opportunities for the poor and underprivileged, and reducing teacher turnover in remote schools.

[141] The Learning Outcome domain of the FSQL instrument consists of 5 variables measuring multiple aspects of learning outcomes, which include 'Lagging students' performance has shown significant learning growth', 'Students have desirable characteristics according to the school curriculum in the school development plan', 'Students meet the curricular competencies requirements', 'Students participated regularly in school or classes until they completed their schooling or received certificate or degree within the normal time frame', and 'Students' Ordinary National Educational Test (O-net) Score or National Test Score (NT) has improved.'

Figure 5-23: FSQL School Input Quality and Learning Outcome Indices



Source: World Bank (2022): "Thailand: Fundamental School Quality Level (FSQL) Instrument Validation."

246. The level of under-resourcing for Thailand's small schools, therefore, goes beyond human resources, learning materials, and physical infrastructure. The results from the FSQL pilot presented in Figure 5-23 and Table Annex 5-1 provide strong evidence that small schools lacking educational staff (both in terms of quantity and quality) were also more likely to be lacking in educational materials, physical infrastructure, school leadership and management quality, as well as classroom practices conducive to learning.

247. The analysis suggests that there is considerable scope for improving Thai students' learning outcomes and reducing achievement disparities. However, achieving these goals requires addressing the misallocations of teachers and other educational resources. Tackling this problem in a cost-efficient manner should be prioritized if Thailand is to successfully raise the standard of education provision and reduce student outcome inequality.

Optimizing educational resource allocation through school network re-organization

248. What is the best way of addressing the teacher shortages identified above? Broadly speaking, there are two ways: 1) allocate staff in accordance with what the curriculum requires (and teacher working hours). Doing so would involve hiring at least an additional 65,400 teachers, a 13.8 percent increase. Or, alternatively, 2) consolidate the school network to create larger, better resourced schools in which no school faces such shortages. The latter option has benefits from both an educational perspective and from a cost-efficiency perspective.

249. This section discusses how such a re-organization could be done, using the results of a school network reorganization (SNR) model developed in World Bank (2020,2022). The model is a tool for policymakers to systematically classify schools into five mutually exclusive school-type categories. These are: i) Hub schools; ii) Affiliated schools; iii) Protected schools; iv) Isolated schools; and v) Large schools. Options for the criteria to be used to determine the five school

types are provided in the package.[142] These options serve as the policy variables for policymakers.[143] The SNR model indicates which of the Affiliated schools could be merged with which of the identified Hub schools so that the aggregate travel distance for students is minimized.

250. The SNR model suggests that as many as 16,889 Affiliated schools could be merged with 6,888 Hub schools, using the SNR model default parameters. Table 5-2 shows that around 3.03 million students were enrolled in the 23,777 Hub and Affiliated schools in 2020. Class sizes in these schools can be seen to be very small, especially for the Affiliated schools where primary level classes average less than 13 students. These schools were also understaffed (teacher-to-class ratios of 1.29 and 1.09 for Hub and Affiliated schools respectively) and the teacher demand model suggests that a total of 328,438 teachers were required to adequately staff all classes in these schools, a 32 percent increase from the teaching force in 2020. At the aggregate level, as many as 540,388 teachers were needed to adequately staff all classes in Thai schools, a 13.8 percent increase over the total teaching force of 475,024.

Table 5-2: Characteristics of Schools by School Type Category – Status Quo[144]

	Hub schools		Affiliated schools		Protected schools		Isolated and large schools	
	Number of schools	Share	Number of schools	Share	Number of schools	Share	Number of schools	Share
Kindergarten	0	0.00%	0	0.00%	0	0.00%	15	0.35%
Primary	4,496	65.27%	13,512	80.00%	940	77.69%	1,031	23.83%
Opportunity	2,373	34.45%	3,363	19.91%	268	22.15%	851	19.67%
Secondary	0	0.00%	0	0.00%	0	0.00%	2,353	54.39%
Complete	19	0.28%	14	0.08%	2	0.17%	76	1.76%
Total schools	6,888	100.00%	16,889	100.00%	1,210	100.00%	4,326	100.00%

	Average class size	Number of classes	Average class size	Number of classes	Average class size	Number of classes	Average class size	Number of classes
Preschool	15.03	15,869	11.08	36,138	8.49	2,471	25.63	9,096
Pri 1	17.53	7,574	12.86	17,075	9.68	1,193	30.96	5,275
Pri 2	17.34	7,524	12.68	17,049	9.22	1,193	31.49	5,091
Pri 3	16.65	7,383	12.08	17,003	8.76	1,182	31.18	4,918
Pri 4	17.17	7,402	12.37	17,016	8.66	1,193	31.78	4,917
Pri 5	17.30	7,371	12.46	16,997	8.85	1,188	32.25	4,885
Pri 6	17.61	7,396	12.71	17,026	9.04	1,190	32.28	4,887
Sec 1	21.10	2,590	17.96	3,485	12.04	266	34.70	13,160
Sec 2	20.26	2,596	17.40	3,494	11.52	269	34.00	13,036
Sec 3	19.41	2,570	16.55	3,469	11.10	269	34.21	12,788
Sec 4	20.13	24	14.50	14	4.50	2	32.16	10,275

[142] The school network reorganization methodology discussed above provides a tool for policymakers to systematically classify schools into 5 *mutually exclusive* school-type categories. Under the default setting, these 5 school types are defined as follows:

Hub schools: Enrolment size of less than 500 (prior to consolidation), located within a cluster, has a football pitch or a children playground, and selected as "Hub" by the School Network Reorganization Algorithm (see Box 3.1 in World Bank (2020))

Affiliated schools: Enrolment size of less than 500, located within a cluster, and NOT selected as "Hub" by the algorithm

Protected schools: Small and Isolated (located more than 6 km from any other school and are not assigned by the algorithm to any cluster)

Isolated schools: Non-small and isolated

Large schools: Enrolment size of more than or equal to 500 student

[143] This report presents one reorganization option at the national level, with an assessment of the number of schools in each category, and the resulting distribution of size of the remaining Hubs and other schools after the proposed school consolidation simulation. Notice that if a different set of policy variables are chosen, then the resulting number of schools in each school type category, the school size distribution after the proposed school consolidation, the number of teachers required, and the travel distance for the students will also be different.

[144] Table 5-2 represents a different grouping of schools (into Hub, Affiliated, Protected, and Isolated and Large groups) than that presented in Table 5-1 (Small and Non-small groups). The "All schools" column is omitted from Table 5-2 in order to save space. This would have been identical to the one shown in Table 5-1.

Sec 5	16.38	24	13.71	14	7.50	2	30.46	10,080
Sec 6	15.56	25	11.33	15	9.50	2	29.47	9,994
Total classes	68,348		148,795		10,420		108,402	
Total teachers	88,102		161,450		9,958		215,514	
Teachers req	107,611		220,827		15,004		196,946	
Total students	1,167,942		1,861,751		94,810		3,454,803	
Avg enrolment	170		110		78		799	

251. With careful planning and support, the SNR model indicates that the 23,777 Hub and Affiliated schools could be merged into 6,888 larger and better resourced-schools, without impairing student access. [145] A total of 12,424 schools would thus remain after the reorganization and their enrolment size distribution would improve significantly. The economies of scale resulting from the merger and the redistribution of existing teachers could reduce or even eliminate the aggregate teacher shortage. The upgrading of school infrastructure and the physical environment could also be carried out much more cost effectively with the smaller number of schools. School network reorganization reform therefore has the potential to enhance Thailand's education spending efficiency and the quality of education provided.

252. The reorganization would reduce the total number of classes in the Merged schools from 217,143 to 142,850 and increase the average primary level class size to more than 23 students.[146] The existing teaching force of 249,552 would therefore be more than adequate as the teacher demand model indicates that 205,226 teachers would be needed to staff the 142,850 classes consisting of 3.03 million students. Even with this reduced number of teachers, the average teacher-to-class ratio for the merged schools would increase to 1.44. Some of the 44,326 surplus teachers could then be reassigned to the Protected schools, which are chronically understaffed (short of 5,046 teachers).

253. It is important to notice that almost all of the Hub and Affiliated (as well as Protected) schools identified by the SNR model are Primary and Opportunity Expansion schools and that the merged classes are almost all in the primary level. Consider Primary 6 classes in Table 5-2 for example. We can see that the original number of classes totalled 24,422 (7,396 in Hub and 17,026 in Affiliated schools). After the simulated school consolidation, the total number of classes at this level would decline to just 14,853.

254. A quick back-of-the-envelope calculation suggests that the proposed school merger would result in more than 15 percent surplus teachers in the Merged and the Protected schools, and could be expected to reduce per-student spending at the primary level by as much as 11.2 percent. Given the estimated surplus teachers of 15 percent ((44,326-5,046)/(249,552+9,958)) and the fact that personnel (mainly teachers) salary made up around 74 percent of OBEC's education budget (see discussion surrounding Figure 5-7), we can see that the proposed school consolidation would be expected to reduce per-student spending at the primary level by as much as 11.2 percent (0.15×0.74) due to the decline in the number of teachers required to adequately staff the primary classes.

255. As discussed in World Bank (2020), due to the natural retirement rates of teachers and school managers, Thailand can gradually consolidate its school network without having to lay off a single personnel in the process. Any necessary reductions amongst existing staff could very likely be handled through natural attrition since about 14,000 teachers, on average, will be retiring or otherwise leaving the profession each year over the next five years.

256. Nevertheless, the reorganization of schools implies that many teachers would have to change their place of work and this might have legal, practical and financial implications. World Bank (2020) proposes an introduction of

[145] World Bank (2020) suggests that even with the much smaller number of schools emerging from the SNR model, the average travel distance is estimated to decline. Specifically, students' average travel distance to school would decline by about 150 meters - from 5.50 km to 5.36 km (a 2.6 percent reduction) after the reorganization. The decline in the average travel distance may seem counterintuitive at first glance. This is due to the SNR algorithm which selects which of the Affiliated schools should be merged with which of the identified Hub schools so that the aggregate travel distance for all affected students is minimized. In other words, the implicit assumption behind the model is that after the reorganization, every student would "choose" to attend the school located closest to home. This assumption would be realistic only if all remaining schools are of high enough quality and that there would be no reason for parents to send their children to larger/better equipped urban schools further from home.

[146] In the School Network Reorganization model, the 'default' maximum allowable class sizes for pre-primary, primary, and secondary levels were set at 20, 30, and 35 respectively.

a "Special Hardship Allowance" (SHA) for educational personnel assigned to a hardship post. A School Hardship Index would be used to measure the hardship faced by personnel in schools located in difficult environments. This index would be used to determine the level of SHA associated with a posting location, with an objective to incentivize more highly qualified and experienced educational personnel to work in hardship areas, which would also promote equity.

257. It would also be necessary to garner students and parents' support for the reorganization. World Bank (2020) also explores the option of introducing transportation grants (for those living between 5 and 50 km from their designated schools and would be eligible to receive the transportation subsidy), boarding subsidy for students with schooling access difficulty (those who would live more than 50 km from their nearest schools after the reorganization), and additional underprivileged allocation for all poor students to incentivize students and their parents to support the proposed school network reorganization plan. The analysis shows that the efficiency gains resulting from the school network reorganization would be sufficient to fully fund these programs.

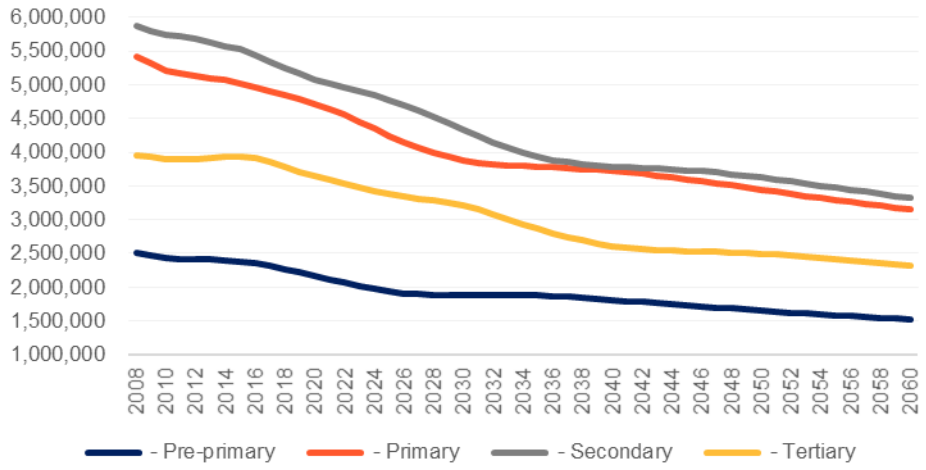
5.6 Projecting Thailand's education financing needs

258. The forecasting model for public education expenditure discussed in this section is premised on four core components: i) student-age population projections by education group; ii) projection of GDP per capita; iii) income elasticity of enrolment demand by education level; and iv) income elasticity of per-student public expenditure by education level. The elasticity parameters were obtained from the international benchmarking exercise of enrolment and spending discussed at the beginning of this chapter, while the student-age population projections were estimated from the UN population projections (2017 revision).

Student-age population

259. Given Thailand's demographic trends, the number of school- and college-age population (3–21-year-olds) is projected to decline considerably in the near future. Specifically, the projected student-age population in the four education groups are presented in Figure 5-24. In the decade to 2032, the number of 3-21 year-olds in Thailand will likely decline by as much as 2.17 million (or 14.3 percent). The primary (6-11 year-olds) and secondary (12-17 year-olds) age groups are expected to register the largest fall of around 16 percent each, while the tertiary (18-21 year-olds) and the pre-primary (3-5 year-olds) population groups are expected to shrink by 12.6 and 8.9 percent respectively.

Figure 5-24: Student-Age Population (3-21 Years Old), Thailand



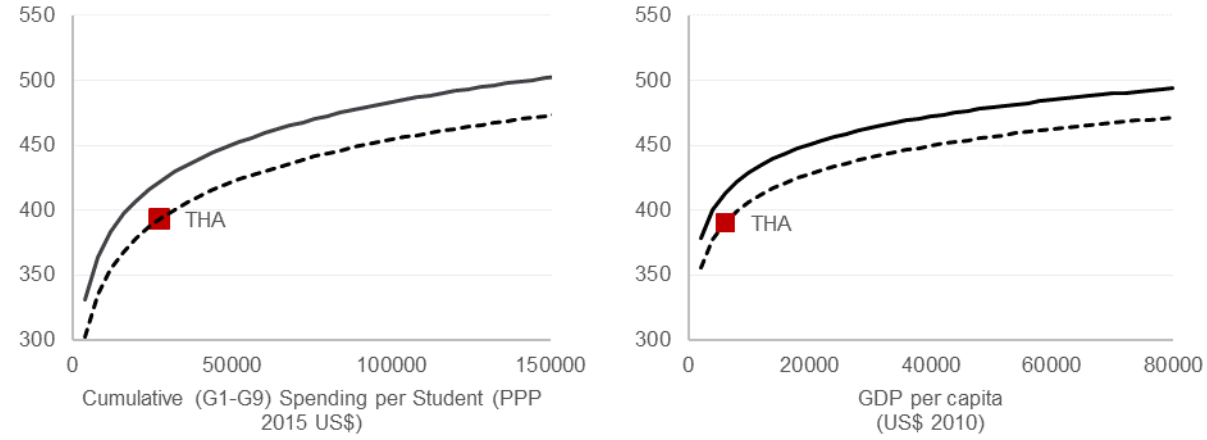
Source: Analysis of the UN projection data

Thai students' performance and economic growth

260. We have seen earlier that the performance of Thailand's 15-year-old students in the PISA 2018 reading assessment was weak, with almost 60 percent of students functionally illiterate. Thai 15-year-old students obtained an average score of 393 on the PISA 2018 reading assessment. This was significantly below the expected score of 422 (415) given the country's level of per student spending (GDP per capita). In other words, Thailand's performance gap to the

'average country' at a similar stage of economic development (as measured using per capita GDP) or level of per-student spending was estimated to be in the range of 22.5-29 points on the PISA scale. This means that Thai students were around 0.75-0.96 year of formal schooling[147] behind their peer group in terms of expected level of learning.

Figure 5-25: PISA 2018 Reading Score vs. Cumulative Spending per Student (Left) and GDP per Capita (Right)



Note: Solid line is cross-country benchmark; dashed line is Thailand's path under low-growth scenario.

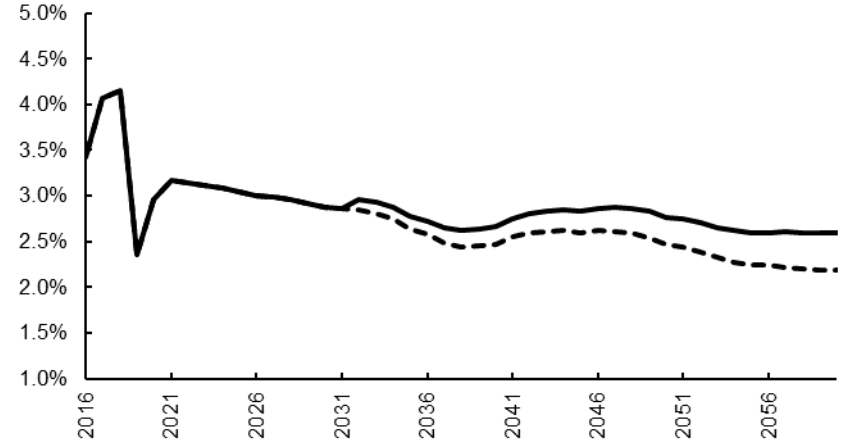
261. It is assumed under the baseline or 'low growth' scenario that Thai students' performance will remain at 29 points or 0.96 year below the expected level. As shown graphically in Figure 5-25, Thailand's PISA score growth path (dotted line) is assumed to remain permanently at 29 points, or 0.96 year of formal schooling, below the world regression line (solid line) under the baseline.

262. The second key component of the forecasting model is the economic growth projection, which is represented by Thailand's GDP per capita (in constant US$2010) growth path. Under the baseline scenario, it is assumed that Thailand's economic growth will proceed at the 'low growth' potential level throughout the forecast horizon. Thailand's long-run growth path, as depicted by its GDP per capita growth, is assumed to proceed as shown by the dotted line projection in Figure 5-26. Implicit in this scenario is that the country's PISA score path (dotted line in Figure 5-25) would remain at 29 points below the world regression line (solid line) throughout the forecast horizon.

263. Under the 'high-growth' scenario, it is assumed that the country's PISA score path would 'gradually' shift up by 29 points to the solid world regression line in Figure 5-25. Our forecasting model employed the approach of Hanushek and Woessmann (2012) in estimating the effect of human capital on economic growth, where countries' initial PISA test scores (in the year 2000) were used as measure of human capital. Specifically, growth models were estimated using available data on 57 PISA sample countries, where the dependent variable was the average annual growth rate in GDP per capita over the 2000–2019 period. The results indicated that a 1 SD increase in cognitive skills (100 points increase in PISA 2000) was associated with between 1.11 to 1.52 percentage points higher average annual growth rate in GDP per capita over the study period. These estimates were all statistically significant at conventional levels. The higher estimate of 1.52 was employed in our forecasting model. The methodology for estimating the effect of human capital on long-run GDP per capita growth is described in Annex 5-2.

[147] PISA scores are scaled so that the OECD average in each domain (mathematics, reading, and science) is 500 and the standard deviation is 100. This is true only for the initial PISA cycle when the scale was first introduced, though, subsequent cycles are linked to the previous cycles through item response theory (IRT) linking methods. A score of 30 points is equivalent to one year's worth of learning (OECD PISA).

Figure 5-26: Thailand's GDP per Capita Growth Paths – Low-growth (dotted) and High-growth (solid) Scenarios



Source: World Bank staff projection (actual data up until 2019)

264. Notice that the projected learning improvement and the resulting economic gains are assumed to undergo gradual processes. Under the 'high-growth' scenario, our forecasting model assumed that an effective education reform will commence in 2023 and that grade 1-entering students (6 year-olds) from 2023 onwards would benefit from the improvement in the quality of education throughout their entire schooling careers. It is also assumed that the first cohort of beneficiaries will enter the labor market in 2032; the second cohort in 2033; and so on, and that all workers would retire at the age of 65. The resulting GDP per capita growth path under the 'high-growth' scenario is depicted as the solid line graph in Figure 5-26, where it can be seen that the effect of education quality improvement that has started in 2023 will only begin to affect the economy in 2032 when the first cohort of student beneficiaries begins to enter the labor market.

265. As described below, the improved learning outcome / high-growth scenario is achieved by a combination of i) boosting per-student spending at the pre-primary, secondary and tertiary levels to cross-country benchmarks; and ii) boosting secondary and tertiary enrolment rates. As discussed in Annex 5-3, there are several ways in which additional spending at these levels could be used to improve student learning to the level consistent with cross-country benchmarks (as per the solid line in Figure 5-25) and consistent with the high-growth scenario.

Enrolment rates and public expenditure per student

266. The income elasticity of enrolment demand parameters was estimated from fitting regression lines through cross-country scatter plots of enrolment rates versus the logarithm of GDP per capita. Specifically, the elasticity parameters are indicators to the sensitivity of enrolment that are affected by variations in countries' level of development (as measured by GDP per capita). Consider pre-primary net enrolment rate for example. The 'fitted world regression line' is shown as a solid line graph in the left-hand chart of Figure 5-27. As economies progress and GDP per capita rises, we can see that pre-primary enrolment demand also increases along the world regression line. Pre-primary enrolment rate for Thailand can be seen to be around 18 percentage points above its peers at similar stage of development. Under all simulation scenarios, it is assumed that Thailand's pre-primary enrolment rate will remain at 18 percentage points above its peers throughout all stages of economic development until net enrolment reaches 100 percent.

Figure 5-27: Pre-primary Net Enrolment Rate vs. Logarithm of GDP per Capita

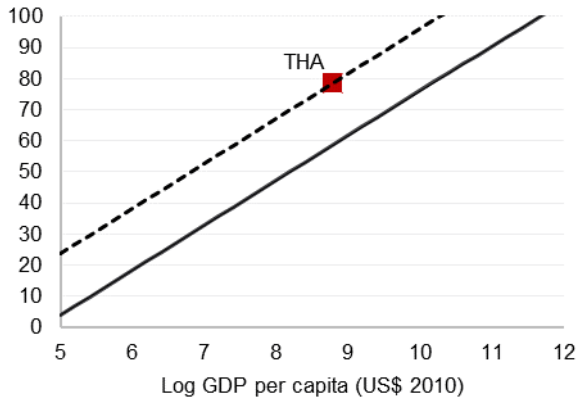
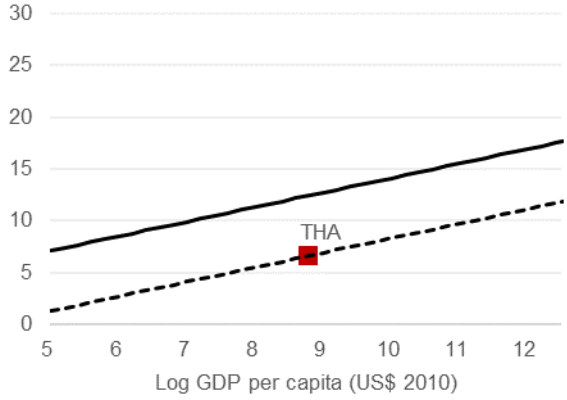


Figure 5-28: Public Expenditure per Pre-primary Student as Percentage of GDP per Capita vs. Logarithm of GDP per Capita



267. Under the improved learning outcome / high-growth scenario, secondary and tertiary enrolment rates increase to cross-country benchmarks. Universal primary enrolment is assumed to be maintained throughout the forecast horizon in all scenarios, while secondary and tertiary gross enrolment rates are assumed to remain below the world regression lines in the 'low-growth' scenario. Thailand's primary gross and net enrolment rates have been around 103 and 98 percent respectively since early 2000's. Universal primary enrolment is therefore assumed throughout the forecast horizon in all scenarios. Secondary and tertiary gross enrolment rates, however, were slightly below the expected levels given the country's GDP per capita. Under the low-growth scenario, it is assumed that secondary and tertiary enrolment rates would proceed along the dotted line graphs below the world regression lines (see corresponding graphs in Figure Annex 5-4-1 in Annex 5-4) throughout all stages of economic development. Under the 'high-growth' scenario, it is assumed that secondary and tertiary gross enrolment vs. log GDP per capita paths will 'gradually' shift up to the world regression lines (see Figure Annex 5-4-1 in Annex 5-4). Our forecasting model assumes that the transformation process would be gradual and would take 15 years from 2023 for the enrolment paths for these two education groups to reach their respective world regression lines.

268. The income elasticity of per-student public expenditure parameters was similarly estimated from fitting regression lines through cross-country scatter plots of public expenditure per student (as a percentage of GDP per capita) vs. the logarithm of GDP per capita. Similar to the approach of projecting enrolment rates, the 'fitted world regression lines' were estimated and are presented as solid line graphs in Figure 5-28 and Figure Annex 5-4-2 in Annex 5-4 for the four levels of education. Once again, we observe that public expenditure per student as percentage of GDP per capita for each education level increases with economic progress (as measured by GDP per capita).

269. To reach the improved learning outcome / high-growth scenario, it is assumed that Thailand gradually shifts its public per-student spending as a percentage of GDP per capita at the pre-primary, secondary, and tertiary levels upwards to be in line with cross country averages (i.e. until per-student spending at each level reaches the solid world regression lines). Again, our forecasting model assumes that the transformation would be gradual and would take 15 years, starting from 2023, for the public per-student spending paths for these three education levels to reach their respective world regression lines. On the other hand, under the 'low-growth' or business-as-usual scenario, it is assumed that Thailand will proceed along the dotted line graphs in all education levels shown in Figure 5-28 and Figure Annex 5-4-2. Specifically, it is assumed that the country will maintain its public under-spending in the pre-primary, secondary, and tertiary levels and its over-spending in the primary level throughout the forecast horizon.

270. Recall from our earlier analysis that the bulk of the basic education spending inefficiency could be traced overwhelmingly to the primary level. Most of the cost-inefficiency was found to arise from the existence of too many small schools and classrooms, resulting in poor teacher allocation and unnecessarily high per-student spending. Therefore, under the 'high-growth' scenario, our forecasting model assumes that an effective education reform will commence in 2023 and one component of the reform would seek to eliminate this inefficiency (perhaps through school network

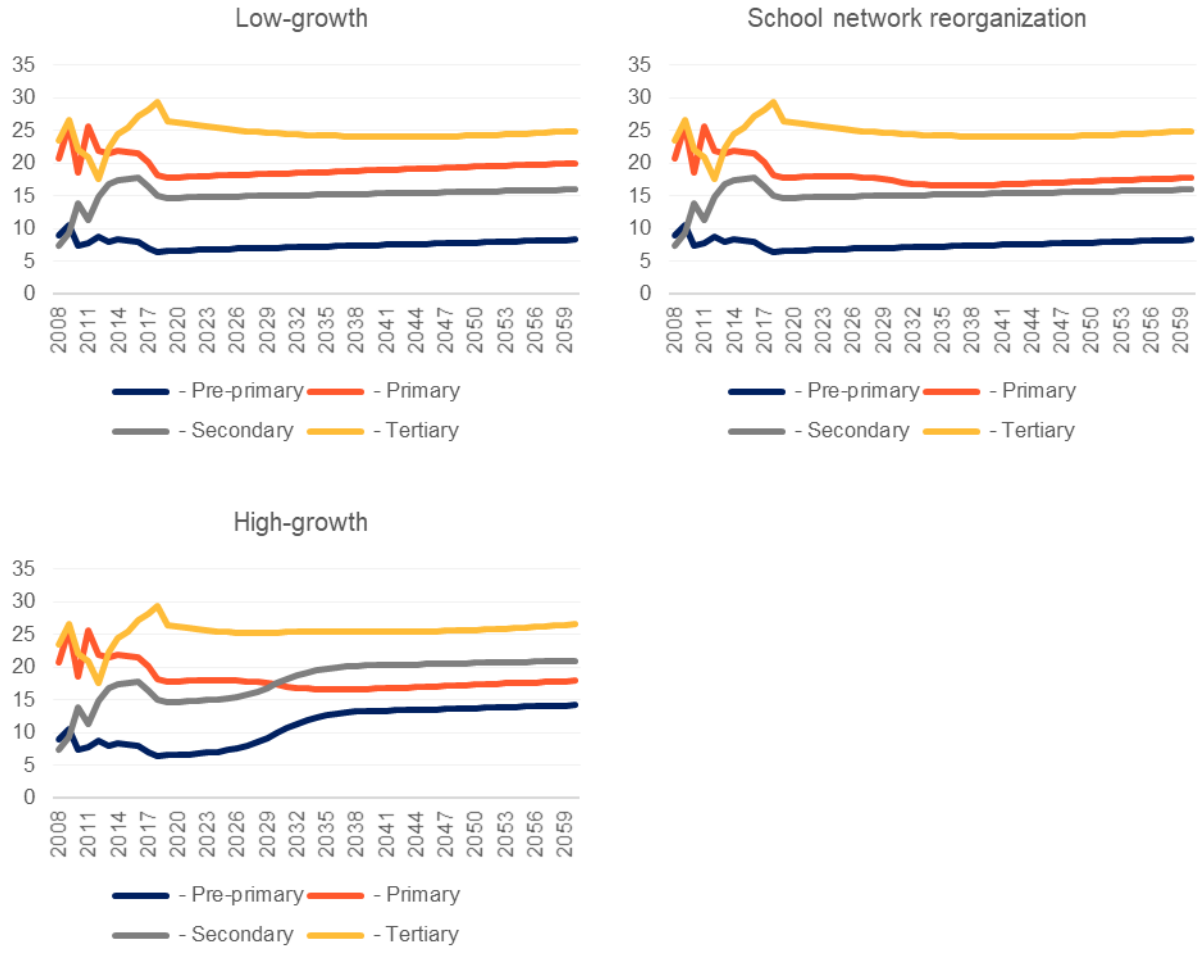
reorganization). Once again, it is assumed that the transformation process would be gradual and would take 15 years for the per-student spending path to shift downward to the world regression line. Under this assumption, the per-student spending path for primary level would shift downwards by around 11.5 percent. This is consistent with the 11.2 percent reduction estimated in Section 5.4 (see discussion surrounding Table 5-2).

Simulation results

271. Three different scenarios are analyzed in this section to shed light on the likely education financing needs for Thailand. First is our baseline or 'Low-growth' scenario, where the Government of Thailand is projected to carry on business-as-usual management of the country's education sector and the economy's long-run growth path is assumed to follow the low-growth potential level (dotted line in Figure 5-26). The second scenario is called 'School network reorganization.' This scenario is the same as the baseline scenario in every way, except that the Government will begin to implement a 15-year program to downsize Thailand's vast network of mainly primary schools in 2023. By changing only one factor in the model, we will be able to clearly assess the impact of the spending efficiency improvement on Thailand's future education financing needs. The last 'High-growth' scenario assumes that the Government is ambitious and will initiate wide-ranging reforms to improve student learning. These reforms would encompass school network reorganization to improve teacher allocation and spending efficiency, substantially raising public per-student spending at the pre-primary, secondary, and tertiary levels to be in-line with international peers, and boosting secondary and tertiary enrolment rates. It is assumed that these reforms will significantly improve student learning and shift Thailand's PISA score path up by 29 points to the solid world regression line in Figure 5-25. Thailand's GDP per capita growth will also be shifted to the 'High-growth' scenario as given by the solid line graph in Figure 5-26.

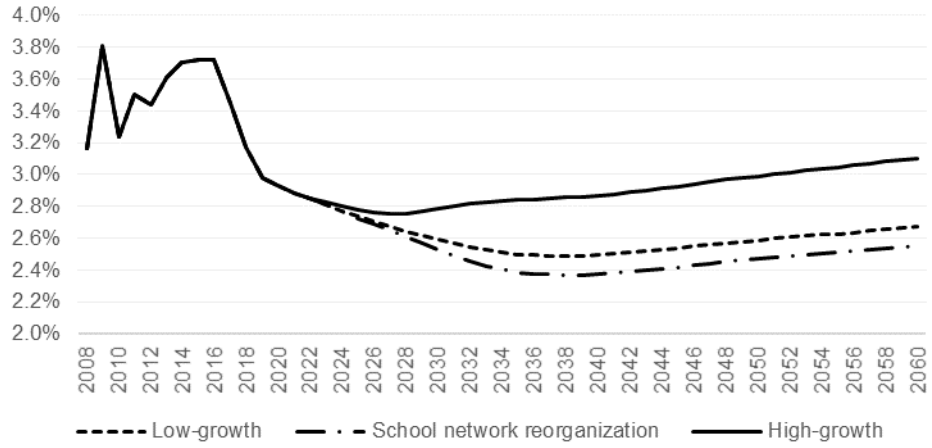
272. The projections of public expenditure per student as percentage of GDP per capita under the three scenarios are presented in Figure 5-29. The high spending inefficiency at the primary level can be seen from Thailand's unusual spending pattern. Consider the 'Low-growth' chart in Figure 5-29. Here, we can see that public spending per student at the primary level has been consistently much higher than at the secondary level, although the gap has come down over the last decade. Under the school network reorganization scenario, per-student spending at the primary level declines (compared with the low-growth status quo scenario) due to the consolidation of small schools and the associated decline in staffing costs. As discussed in the preceding paragraph, the reforms considered under the 'High-growth' scenario are projected to gradually shift Thailand's spending pattern to be more in line with international peers with per-student spending at the pre-primary, secondary and tertiary levels shifting upwards to be aligned with international benchmarks.

Figure 5-29: Projected Public Expenditure per student as Percentage of GDP per capita



273. The projections of Government total expenditure on education as percentage of GDP under the three scenarios are presented in Figure 5-30. Under the baseline or 'Low-growth' scenario, it is projected that total education spending as percentage of GDP will continue to decline until 2038, before rising slowly thereafter. The decline will primarily be driven by the rapidly shrinking student population. As expected, 'School network reorganization' will likely improve education spending efficiency and the model predicts that spending will fall by 0.115 percentage points after the reform is fully implemented, due to reductions in per-student spending at the primary level. In the 'High-growth' scenario, total public spending can be seen to be much higher than in the baseline scenario as a result of the envisioned increases to per-student spending at all levels other than primary.

Figure 5-30: Government expenditure on education as percentage of GDP



274. Would the present value of the expected future benefits (in terms of higher economic growth) be higher than the present value of the cost of reform? This question is addressed by calculating the difference between the projected GDP paths in the 'High-growth' and 'Low-growth' scenarios from 2022 to 2100 and comparing the result with the present value of the difference between the projected total public education expenditures from the two scenarios. Employing a discount rate of 3 percent, the present value of the benefit is US$ 3.303 trillion, while the present value of the cost is US$ 252.3 billion (in constant US$ 2010). Therefore, the net present value of the reform is estimated to amount to US$ 3.051 trillion, which is equivalent to as much as 615 percent of Thailand's projected GDP in 2022.

5.7 Conclusion and recommendations

275. Thailand's oversized school network should be reorganized to ensure that limited educational resources are adequately and equitably redistributed. The World Bank's teacher demand model suggests that if the current distribution and size of schools remain unchanged, Thailand would need to recruit, train, and deploy around 65,400 additional teachers (a 13.8 percent increase in the teaching force) in order to adequately staff all classes in the schools. A better and more cost-efficient approach is to drastically downsize the vast network of schools and to ensure that teachers (and other educational resources) are equitably redistributed to improve both the quality and equity of the system. The analyses in this chapter indicate that the proposed merger of mostly primary schools would result in more than 15 percent surplus teachers, and could be expected to reduce per-student spending at the primary level by as much as 11.2 percent. The reorganization could be done gradually over time without the need for any teachers to be laid off.

276. The overall education spending envelope should be increased with the savings from the school merger utilized to increase per-student spending, especially at the pre-primary and secondary levels. Overall public expenditure on education in Thailand has declined significantly in recent years, partly as a result of the COVID-19 pandemic. Government spending on education of just 11.7 percent of total public expenditure in 2021 was well below the 18.9 percent observed in 2011 and the 14.7 percent expected rate given the country's stage of economic development. As the economic impact of the pandemic eases, Thailand should aim to raise spending per pre-primary and secondary student to be in line with international benchmarks.

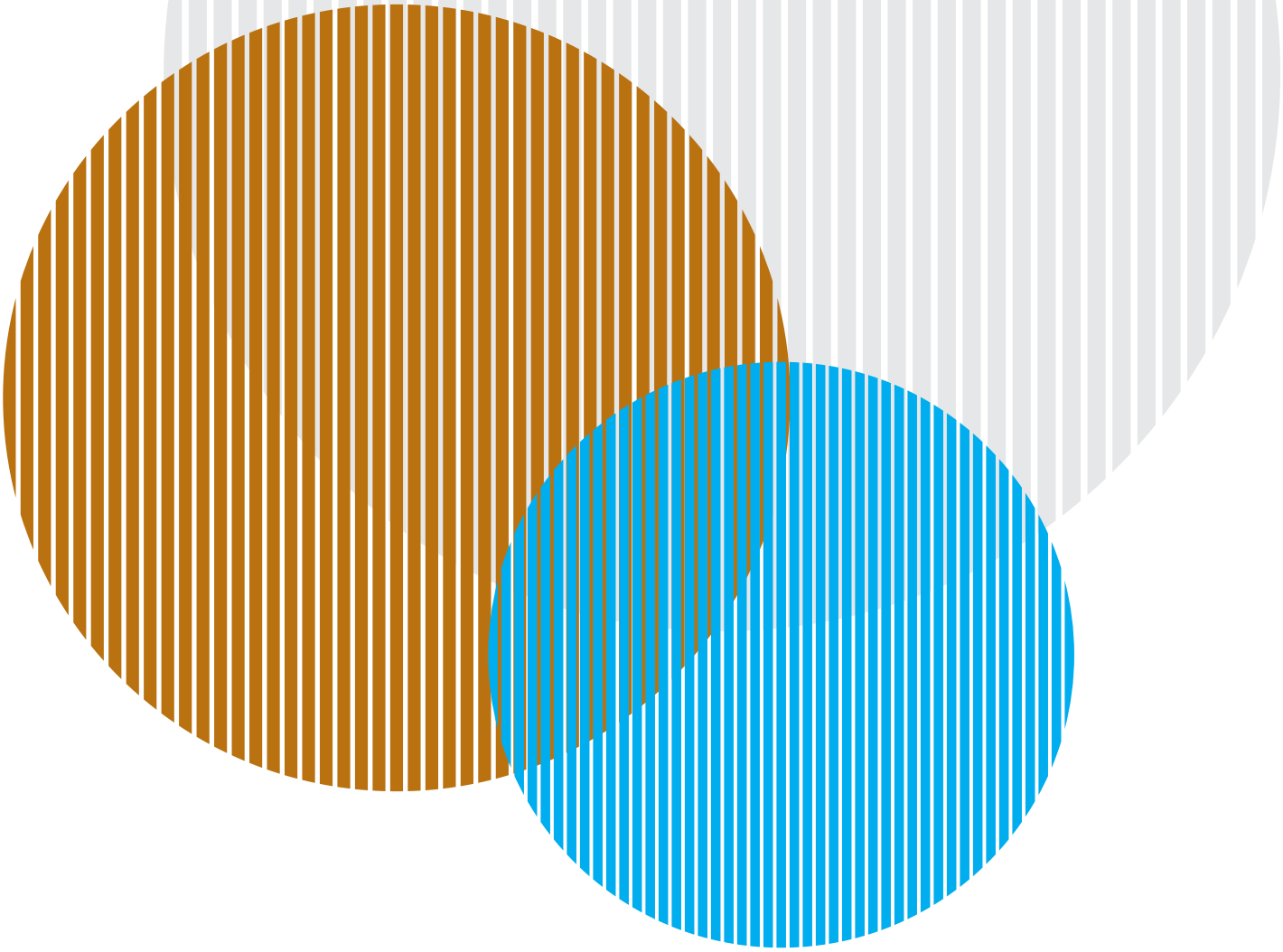
277. It is important that the country urgently addresses children's school readiness by making high-quality preschool available to every child. The recommendation is given in light of the fact that only 61 percent of Thai children aged 3-5 were developmentally on track in the literacy-numeracy domain (UNICEF, 2020) and that the level of per-student spending in 2019 was as much as 47 percent below its comparable international peers. Research has shown that investment in high quality preschool programs generates high economic returns, which could be expected to be in the US$3.4-8.5 range for every dollar invested (Cascio and Schanzenbach, 2013).

278. At the secondary level, Thailand could first embark on reducing class sizes and providing adequate resources to its schools. Thailand's average class size of 37.3 was the 9th largest among the 79 education systems which participated in PISA 2018. By contrast, class sizes in OECD countries averaged at only 26.2. Moreover, in the PISA 2018 school

survey, school principals in 'Average' and 'Disadvantaged' as well as 'Rural' schools reported that their schools' capacity to provide instruction was hindered by 'A lack of/inadequate or poor quality' educational material and physical infrastructure. The same was also true in the area of teaching and supporting staff (World Bank, 2020).

279. Thailand needs to generate better and more frequent data on the quality of school inputs, establish minimum quality standards, and provide resources to ensure that all basic education schools meet them. A new instrument conceived by World Bank (2020), called the Fundamental School Quality Level (FSQL) Standards, provides a good starting point. As mentioned earlier, the instrument was recently tested on 275 remote schools. The results from the survey questionnaire were used to construct 10 FSQL school input quality indices (School leadership and management quality; Student-centric teaching; Classroom management; Teacher development; and 6 Infrastructure, utility, and service facility indices), which were found to correlate significantly with the learning outcomes of students. This is important because the FSQL standards are intended to provide guidance to policy makers and school leaders about areas for improvement which would result in improved student learning. A second and final pilot of an improved version of FSQL is currently being planned. After the second pilot, the instrument should be ready for nationwide implementation.

280. A recent World Bank (2020) report on Thai basic education concludes that educational outcomes are driven by five key factors or foundations for success: educational resources, quality instruction, learning time, inclusive learning environment, and family support. The report recommends that policymakers and educators pay attention to: i) Making schools inclusive, safe, and welcoming; ii) Strengthening teaching quality and addressing the poor allocation of educational resources; and iii) Making effective use of learning time. Furthermore, World Bank (2018) provides econometric evidence from Thailand for the presence of institutional features that are complementary to local autonomy in schools. Specifically, the study sheds light on the set of accountability-enhancing activities or policies, or their combination with local autonomy which could lead to improvement in student performance. The findings of these reports are discussed in Annex 5-1 of this Chapter.



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World Bank Group, Siam Piwat Tower, 30th Floor, 989 Rama I Road, Pathumwan, Bangkok 10330
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