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Low Fertility, Ageing Buildings, and School Congestion in the Philippines: Tailwinds, Headwinds, and Some Policy Options

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Abstract

We estimate the future demand for public school classrooms using new school children population projections for 82 provinces and 33 urbanized cities of the Philippines up to 2060. A return to replacement-level fertility from the current 1.9 total fertility rate (TFR) is expected to ease demand for public school classrooms, except in BARMM, where the population of school-age children is projected to continue increasing. Below replacement TFR will likely result in greater easing of classroom congestion in public schools. However, the large school infrastructure backlogs and ageing of existing school buildings are expected to remain important issues in the future despite potential tailwinds from low fertility. We also highlight potential contributing factors to current classroom congestions.

Keywords: school infrastructure, low fertility, population projection

Low Fertility, Ageing Buildings, and School Congestion in the Philippines: Tailwinds, Headwinds, and Some Policy Options

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1. Introduction

Average public school class sizes in the Philippines are about twice as large as the average class sizes in developed countries. In some local public schools, class sizes may even go beyond 60 students in one room, or more than thrice those in industrialized nations. This could have serious implications on how teachers and students interact in classroom settings that could ultimately affect learning outcomes.

In this study, we document the spatial distribution of classroom congestion in the Philippines and explore possible contributing factors to this issue. We draw from the rich administrative databases collected and maintained by the Department of Education, as well as from insights from field personnel and administrators of various government agencies. We also provide long-term projections of province-level classroom deficits across the country that leverages on small-area population projections and school building obsolescence models that we have developed for this study.

The recent decline in the Philippines' fertility rate below replacement level provides an opportunity to ease public school classroom congestion across the country. Population projections by the Philippine Statistics Authority (2024a) points to a substantial drop in the country's school-age population until 2055 in all scenarios it considered. If coupled with substantial, concerted, and targeted investments in classroom construction, this could potentially solve the country's school congestion issues within the next few years. When fiscal space is limited, however, policymakers and planners need to prioritize the best use of limited resources. Finding the right balance between class sizes and the potential returns on investments from school decongestion is therefore of supreme importance.

Smaller class sizes do not necessarily translate to better schooling outcomes among students. A meta-analysis of early childhood education programs in the United States by Bowne, et al.,

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(2017), for example, found that benefits of class size reduction on student cognition and school achievement are significant only for those with very small class sizes, i.e., less than 15. In India, Datta and Kingdon (2023) estimated that there are no additional benefits in student learning from reducing class sizes below 40 for science and below 50 for other curricular subjects.

These findings from the literature suggest a couple of insights relevant to the Philippines. First, targeting optimal class sizes could be a very expensive endeavor to improve learning outcomes, at least when using 15 as an ideal class size. Reducing class sizes requires not only massive investments on building infrastructures, but also on maintenance for building upkeep and more importantly, in hiring additional administrators and teachers to operate schools. Second, there may be minimal benefits to be had from reducing class sizes below what many Philippine schools currently operate on, i.e., around 40 to 50. Aiming for much smaller class sizes through various public investments may therefore not be the most cost-effective use of scarce resources, which could have gone to other more promising interventions.

But the issue of school congestion goes beyond learning achievement. Several studies have documented positive association between smaller class sizes and better classroom experiences among students (Blatchford, 2003; Bruhwiler and Blatchford, 2011; Dee and West, 2011; Hallaq, 2024). Teachers in smaller class sizes are also found to be better in diagnosing student achievement (Bruhwiler and Blatchford, 2011) and to provide more individualized teaching (Molnar, et al., 1999; Betts and Shkolnik, 1999; Blatchford, et al., 2003). However, better performing teachers are also given greater workload by principals (e.g. Barret and Toma, 2013), which may affect teaching effectiveness. In addition, policies to reduce class sizes, such as hiring more teachers, could temporarily depress teaching quality by more lenient hiring processes (e.g. Dieterle, 2015).

This study's primary contributions are threefold. First, we draw attention to extant issues related to classroom congestion and school infrastructure investment in the context of a developing country. In so doing, we highlight potential meaningful interventions that governments could explore to address classroom congestion. Second, we provide long-term projections of public school classroom deficits at relatively finer spatial resolution, i.e., at the province level. Available population projections for the Philippines are typically available at the national and regional levels, which may be too coarse for localized planning, such as classroom construction. In this study, we calculate future classroom demand based on enrollment projections and classroom supply based on building obsolescence models. Finally, this study is a use case of leveraging available administrative databases collected regularly by government agencies to document and understand important social issues.

The rest of this paper is organized as follows. In the next section, we provide a spatial overview of public school congestion and classroom deficits in the Philippines based on the latest information from the Department of Education's Basic Education Information System. In Section 3, we trace possible contributing factors to the school congestion presently experienced across the country. We draw from secondary analysis of available administrative data, as well as from insights from interviews with key informants. This is followed in Section 4 with our projections of public school classroom deficits in the country, which considers future public school enrollment and ageing of school buildings. Finally, in Section 5, we conclude the study with a summary of our results and some insights for policy.

2. Public school congestion in the Philippines

The Philippines has made important strides in expanding public school infrastructure to address classroom congestion. Over the last decade, average classroom student ratios have declined from 1:39 in 2010 to 1:32 in 2021 for elementary level, and from 1:54 in 2010 to 1:44 during the same period for junior high school (National Economic and Development Authority [NEDA], 2017, 2023). But such decline has been a recent phenomenon, with classroom-student ratios practically remaining unchanged since 2000s until early 2010s (c.f. Navarro, 2022). Furthermore, closer inspection of school-level statistics shows marked variation in student-classroom ratios across public schools across the country.

Figure 1 shows choropleth maps of the median student-classroom ratio within provinces, including administrative districts in the National Capital Region (NCR), across education levels in 2021. The maps show that administrative divisions in the NCR, CALABARZON (Region IV-A), Soccskargen (Region XII), and the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) have higher median student-classroom ratios compared with the rest of the country. Using 1:50 as a benchmark[7] classroom-student ratio, Figure 1 shows that school congestion is more pronounced and more geographically spread out at the junior and senior high school levels compared to the elementary level.

These observations are supported by choropleth maps in Figure 2, which shows the share of public school students within administrative boundaries who are enrolled in congested schools, i.e., with at least 1:50 classroom-student ratio. In NCR's Northern Manila District, as much as 90 percent of public elementary school students had been enrolled in congested schools. Surrounding areas were only slightly behind: Southern Manila District (76.8%), Eastern Manila District (60.1%), Rizal (66.0%), and Cavite (57.7%).

A significant proportion of public high school students were also enrolled in congested schools in Metro Manila in 2021. However, unlike in elementary level, classroom congestion appears to be more spatially dispersed at the secondary school levels, wherein at least 15 provinces have had at least half of public high school students enrolled in congested schools in 2021. Outside NCR, public high school congestion by the share of students was most pronounced in Sulu (95.7%), followed by Maguindanao del Sur (76.8%), Maguindanao del Norte (74.8%), and Basilan (74.5%), which are all provinces of BARMM.

The extent of classroom deficits, which we define here as the number of required classrooms to attain our benchmark classroom-student ratio in excess of available classrooms, is more expansive in both scale and dispersion at the elementary level. In total, our calculations indicate that approximately 108,000 new classrooms[8] are needed to address public school congestion across the country, based on enrollment figures and classroom supply distribution in 2021. The majority of this requirement is at the elementary level (70,187 classrooms), followed only by junior high school (30,724 classrooms) and senior high school (7,425 classrooms). Much of these deficits are located in NCR and neighboring provinces in CALABARZON and Central Luzon, as well as in other regional centers such as in Cebu and Davao del Sur.

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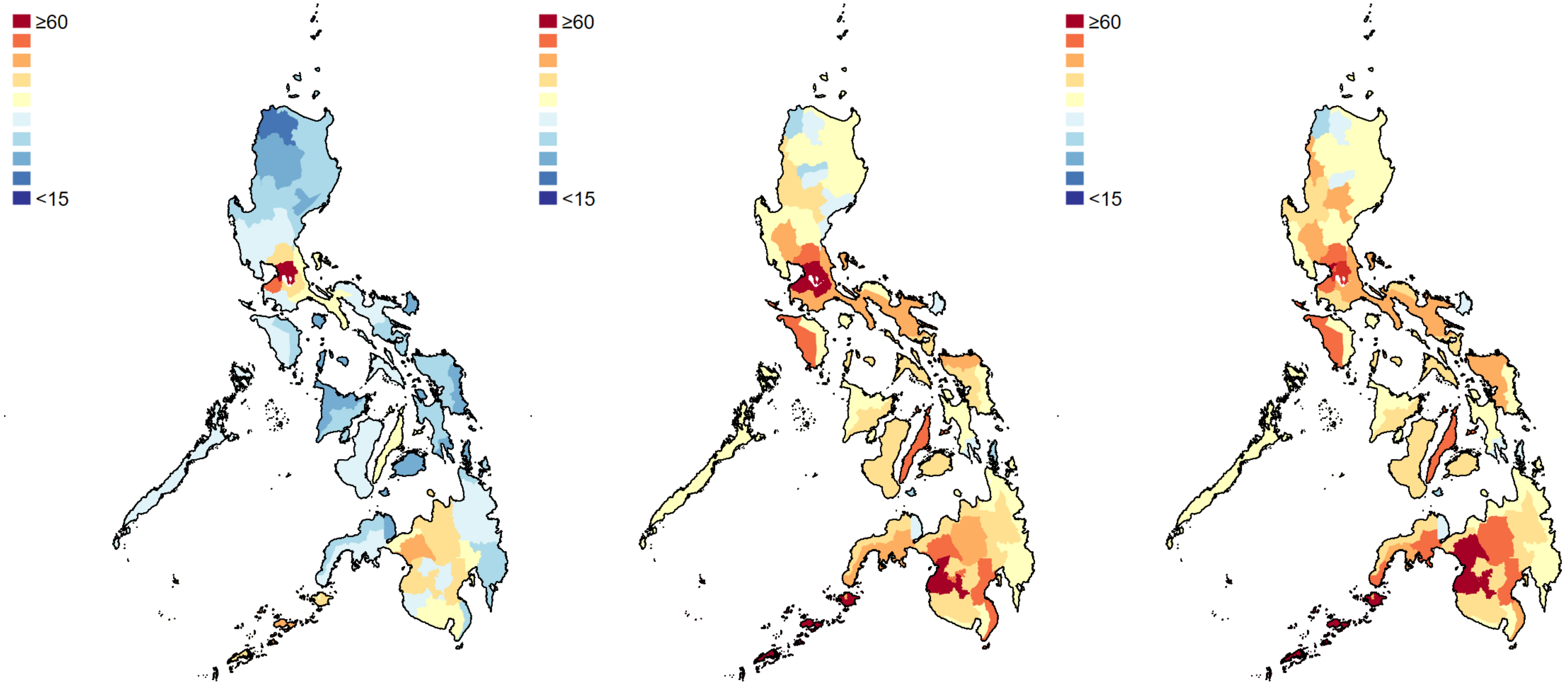
[7] For illustration purposes only. The 2023-2028 Philippine Development Plan (NEDA, 2023) has set a more stringent classroom-student target of 1:32 for elementary level and 1:40 for high school level by 2024.
[8] Note that this is significantly lower than the estimates by the Department of Education, which is based on more stringent benchmarks for classroom-student ratios.

Figure 1. Median student-to-classroom ratio by level and province, 2021

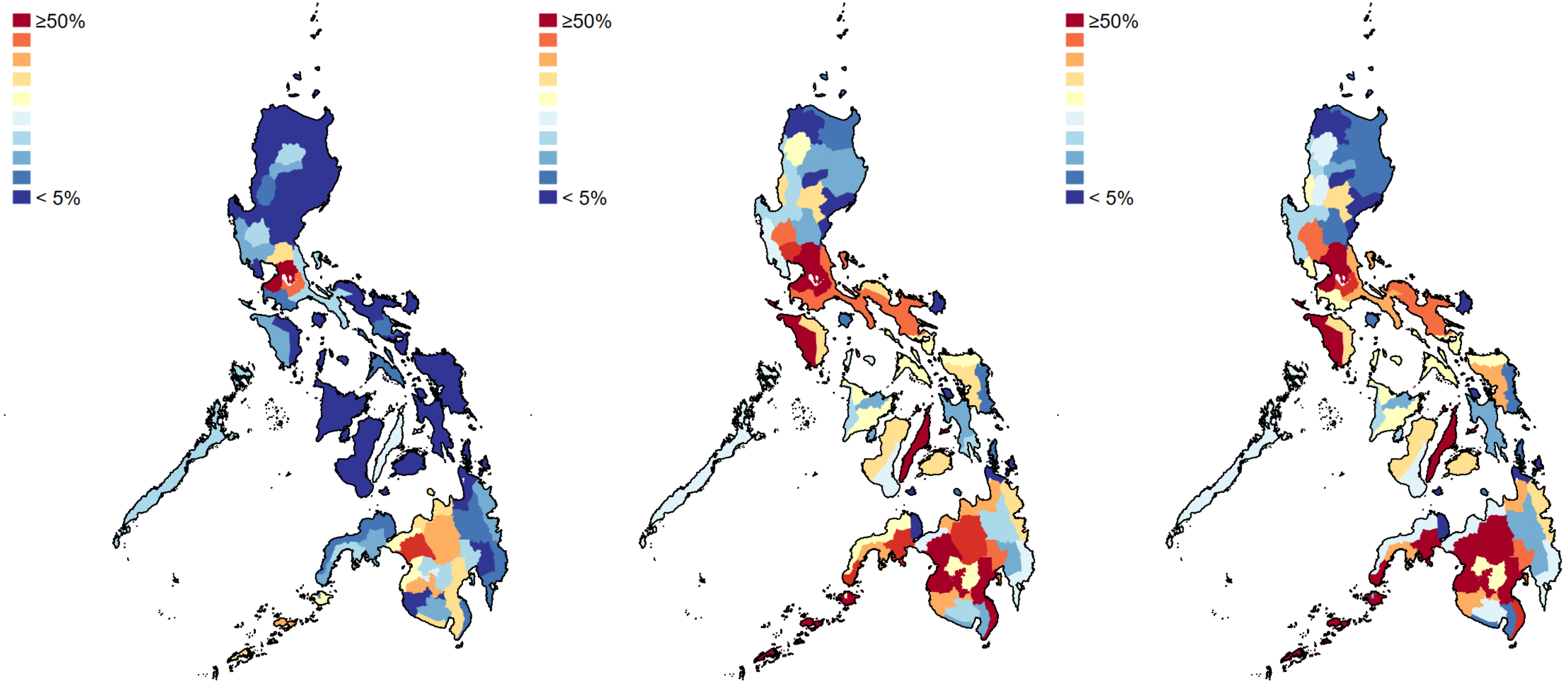
A. Elementary School B. Junior High School C. Senior High School



Source: Authors' calculations based on DepEd Basic Education Information System (BEIS) data.

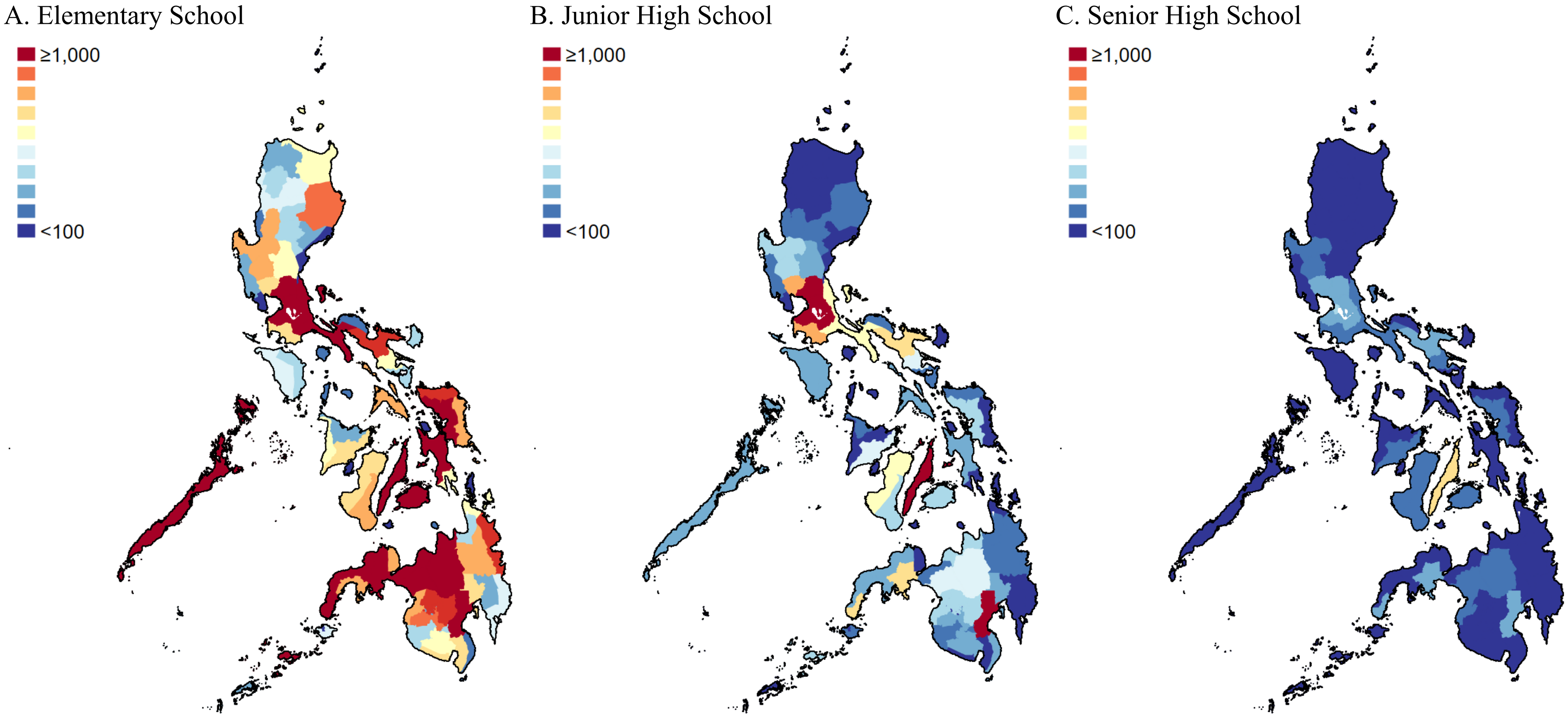
Figure 2. Share of students in congested public schools by level and province, 2021

A. Elementary School B. Junior High School C. Senior High School



Source: Authors' calculations based on DepEd-BEIS data.

Figure 3. Classroom deficit by level and province, 2021



Source: Authors’ calculations based on DepEd-BEIS data.

3. Extant issues on classroom construction

What could have possibly contributed to the classroom congestion experienced in public schools across the country? We explore several potential factors in this section. We need to emphasize that the factors we identified here are neither collectively exhaustive nor mutually exclusive, but are rather only suggestive and likely jointly reinforcing.

3.1. Limited funding

The national government, through the Department of Education (DepEd) and the Department of Public Works and Highways (DPWH), together with local governments and partner institutions, has continuously invested in the construction of new classrooms over the years. However, these investments were practically not enough to catch up with increasing public school enrollment, as new construction was only enough to replace dilapidated facilities (Navarro, 2022; World Bank and Australian AID, 2012). Indeed, the total asset value of public school buildings had remained unchanged at around PhP60 billion (in 2018 prices) between 2000 and 2011, despite increasing budgetary allotment through the years. Over the same period, the total public school enrollment had grown by about 4.2 million (see Table 1).

National government allocation on public school buildings has increased through the years. In 2005, DepEd's School Building Program was given a budgetary appropriation of PhP1.6 billion (in 2018 prices), which increased to PhP6.7 billion by 2008 (c.f. World Bank and Australian AID, 2012). This trend in increasing investments on public basic education classrooms generally continued until 2017, when it peaked at PhP128.6 billion, but declined thereafter, especially during the COVID-19 pandemic, as shown in Table 1. Over the same period, the budget utilization rate also increased, reaching as high as 95.6 percent in 2017. Although more recent rates are slightly lower, it is still at a respectable level compared with the considerably lower utilization rates recorded in the early 2010s.

Table 1. Public school enrollment and infrastructure investments: 2011-2023

	2000	2011	2014	2017	2020	2023
Enrollment (Million students)	16.2	20.5	21.0	22.1	22.7	…
School building stock						
School rooms (Thousands)	…	509.8	581.9	699.2	807.9	836.0
Net value (PhP Billions, 2018 prices)	60.8	61.7	54.8	74.8	143.5	201.5
Infrastructure investments						
Appropriations (PhP Billions, 2018 prices)	…	12.9	25.5	128.6	25.6	21.4
Obligations (PhP Billions, 2018 prices)	…	7.2	14.6	123.0	23.1	16.9
Obligations as % if Appropriations	…	55.5	57.3	95.6	90.1	78.8

Source: Audit and Financial Reports by the Commission on Audit, various years; DepEd Statement of Appropriations, Obligations and Balances, various years; DepEd (2023) National School Building Inventory. Note: Monetary values are adjusted to 2018 prices using the annual average Consumer Price Index by the Philippine Statistics Authority.

Had there been no change in public school enrollment and school building obsolescence in the last decade, combined elementary and high school classroom-student ratio would have decreased from 1:43 in 2010 to 1:30 in 2021 as a result of the new classrooms constructed over this period. Had the school building construction been fully expended in addition, this rate could have gone lower to 1:28. However, as administrative records would show, these massive investments in the last decade were only able to push classroom-student ratio down to 1:36 for the combined elementary and high school by 2021.

3.2. Natural wear and tear

School buildings, like any physical infrastructure, have natural wear and tear. For budgeting and recording purposes, the government assigns an estimated useful life for building constructions based on the primary material used: 10 years for wooden buildings, 20 years for mixed wooden/concrete infrastructures, and 30 years for concrete constructions. Based on DepEd's 2023 National School Building Inventory (NSBI), the majority of public school rooms[9] are concrete (72.2%), while the rest are mixed wooden/concrete (25.3%) or wooden (1.6%).

In 2023, about a quarter of concrete constructions, half of mixed wooden/concrete infrastructures, and as much as four-fifths of wooden public school rooms were beyond their expected useful life, as shown in Table 2. Should there be no new public school room construction, virtually all wooden and mixed wood/concrete rooms and about half of concrete school structures would be beyond their useful life by 2040.

Table 2. Useful life of public school classrooms by construction material

Construction material	Number of rooms ('000)	Average age (years)	Estimated useful life (years)	Share of rooms beyond estimated useful life (%)	
				2023	2040
Wood	12	41	10	80.2	100.0
Mixed Wood/Concrete	202	26	20	51.7	95.9
Concrete	576	20	30	24.5	52.9
Others	7	23	…	…	…

Source: DepEd (2023). Note: The estimates exclude about 17,000 public school rooms (2% of total) with construction year not stated.

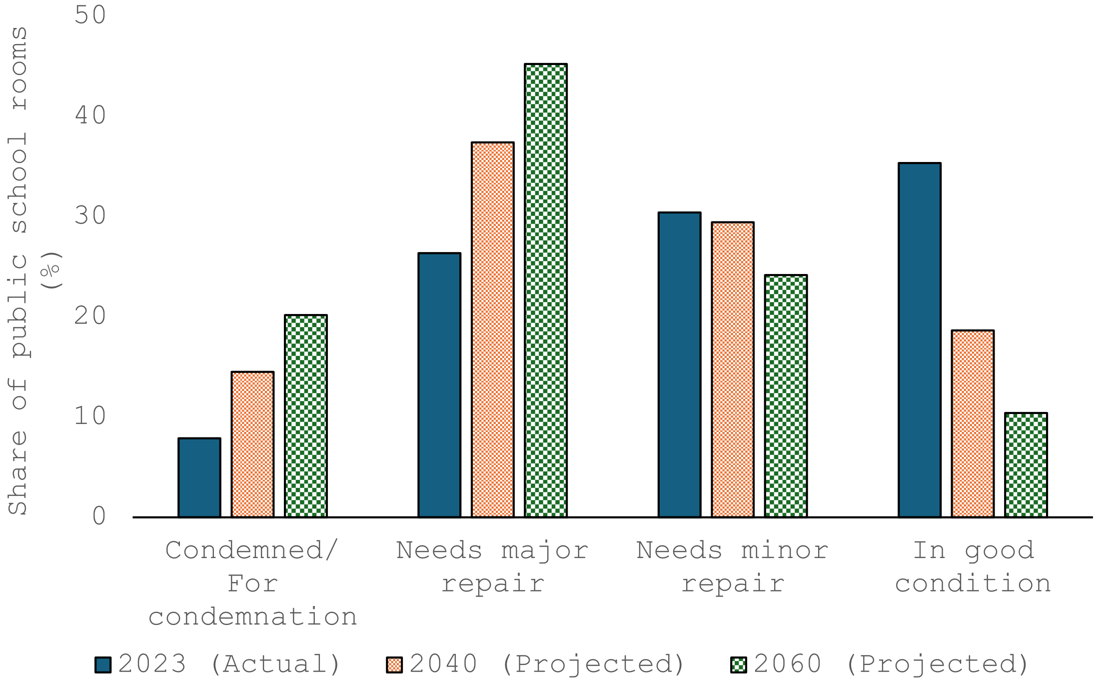
When school rooms are disaggregated by quality condition, about a third of public school rooms in 2023 were in good condition, as shown in Figure 4. The majority needed some repair (56.8%), while a small proportion were either condemned or for condemnation (7.9%). By 2040, with normal wear and tear, only 18.6 percent will continue to be in good condition, while about 14.5 percent will be for condemnation or already condemned if there would be no new construction or repairs over this horizon. By 2060, two-in-ten public school rooms in 2023 would be for condemnation or were already condemned, only one-in-ten would still be in good condition, and the rest would require some form of repair.

[9] This includes both classrooms and other room types, e.g. wash rooms, faculty rooms, clinics, etc.

3.3. Natural and man-made calamities

The Philippines is highly vulnerable to natural disasters, particularly from typhoons, volcanic eruptions, and related calamities, due to its unique location along the Pacific Ring of Fire and the Western Pacific typhoon belt. Together with man-made calamities, e.g. armed conflict and fire incidents, these occurrences pose significant threat not only to lives and livelihoods, but also to properties, such as public school buildings.

Figure 4. Public school rooms by condition: 2023, 2040 and 2060



Source: DepEd (2023). Note: Projections were based on an ordered logit model that controls for school building vintage, construction materials, and other building characteristics.

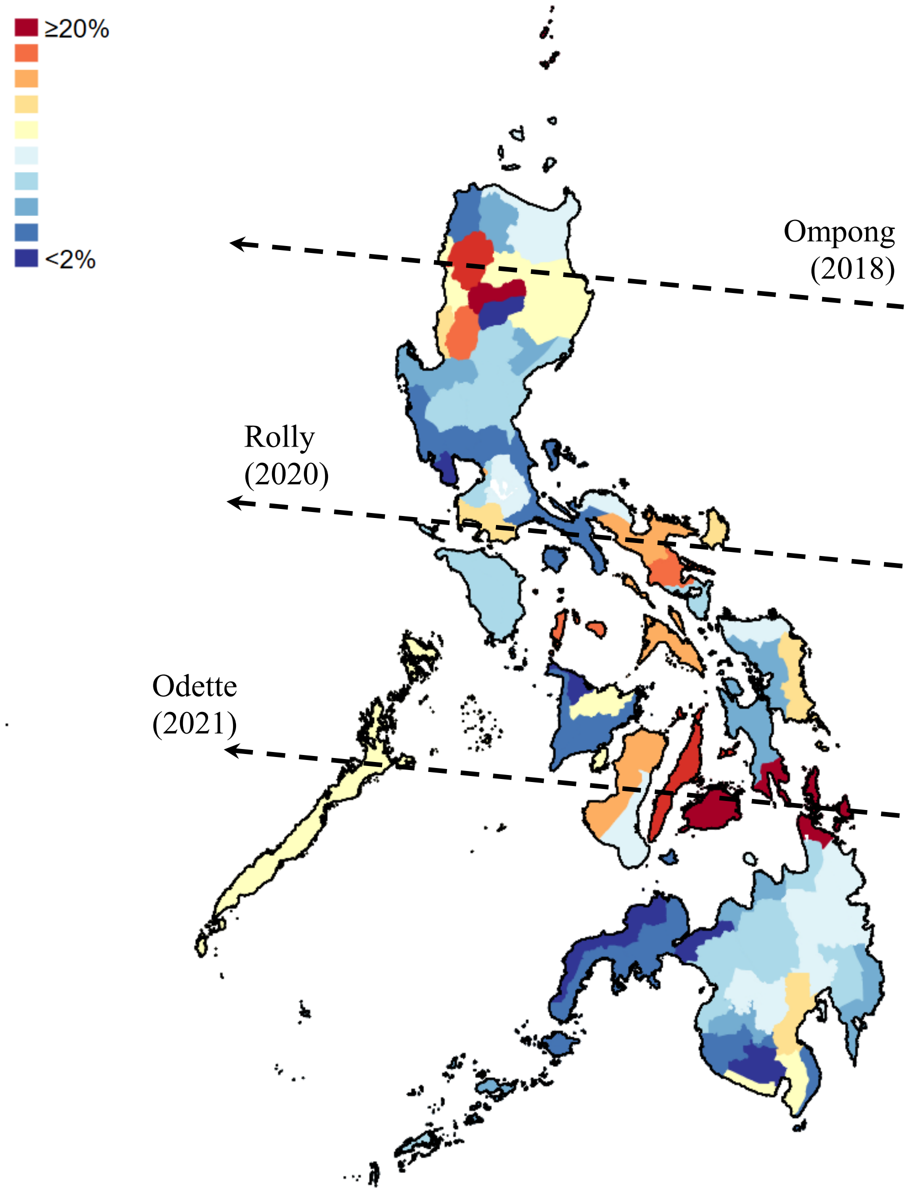
As a case in point, we present in Figure 5 the paths of three of the most devastating typhoons that hit the country in recent years: Typhoon Ompong in 2018 that hit northern Philippines, Typhoon Rolly in 2020 that ravaged Bicol, and Typhoon Odette in 2021 that passed through the Visayas and Palawan. We juxtaposed this with the proportion of new school rooms built between 2018 and 2023 that required major repair or were condemned/for condemnation by 2023, as indicated in DepEd's NSBI. It is quite striking from Figure 4 that these newly built constructions requiring major repair or due for condemnation are concentrated along the typhoons' paths we have mentioned.

3.4. Bottlenecks in project cycle

Bottlenecks at different stages of school construction may snowball across the whole project cycle. On average, it takes around three years to construct one public school classroom – from budget appropriation to actual construction – based on our duration analysis presented in Table 3. But there is quite a wide variation in the duration of public school construction, with its standard deviation ranging between 1.0 to 1.2 years among classrooms funded through national government appropriations between 2014 and 2019.

Based on our duration analysis, at least a quarter of planned public school classrooms between 2014 and 2019 had been constructed within the first year of the respective budget appropriation, while another quarter was finished in the next year or two. The rest of the planned construction takes more time. For public school classrooms funded through the 2014/2015 and the 2016/2017 national budgets, ninety-nine percent of classrooms had been constructed by the sixth and eighth year, respectively. Newer constructions based on the 2018/2019 government budgets were relatively delivered faster, with ninety-nine percent done by the fifth year.

Figure 5. Selected historical typhoon paths and share of new construction for major repair or condemnation, 2023



Source: Authors' estimates based on DepEd (2023). Note: Typhoon paths are approximate.

It may be instructive to compare these with expected construction duration based on models available in the literature. For a 1,000 sq. meter-fifteen classroom-3 story school building, the time-floor model by Kumaraswamy and Chan (1995) based on Hong Kong public construction data predicts a one-year duration from site possession to practical construction. A more elaborate model by Guerrero et al. (2014) based on Spanish data that considers gross floor area, the total number of floors, and construction cost predicts a similar duration of about one-year for the same specification. It must be emphasized, however, that these models only consider the duration of actual construction and exclude other processes relevant in the context of the Philippine public sector, such as procurement and site acquisition.

Table 3. Classroom construction horizon: Fiscal years 2014-2019

Fiscal year	Time to construction (Years)				Number of classrooms			
			Percentile		Constructed			
					Rate per year			
	Mean	SD	50th	99th	Up to median	Median to 99th-tile	Total built	Planned
2014/2015	2.8	1.1	2	6	15,735	7,263	60,961	58,208
2016/2017	3.2	1.2	3	8	16,698	4,969	74,842	33,319
2018/2019	2.9	1.0	3	5	6,276	3,912	26,597	8,444

Source: Authors' calculations. Note: Kaplan-Meier survival functions used to infer the duration of classroom construction were estimated based on administrative data reported by DepEd. The calculation accounts for changing targets and actual construction funded through the indicated General Appropriations Act. SD – Standard Deviation.

We document important bottlenecks across the classroom construction project cycle in the Philippines based on the experiences of key informants from various offices of DepEd, DPWH and NEDA in their central office and seven regional offices, namely, Regions I, VII, VIII, IX, NCR, BARMM and Cordillera Autonomous Region (CAR). These offices were selected based on their roles in the public school building construction project cycle, as well as their spatial diversity. The interviews conducted either in-person or remotely were primarily done by a senior research staff with extensive experience in project monitoring and evaluation.

The respondents have received the interview questions prior to the interview proper. Throughout the data gathering process, we have prepared field notes and a preliminary coding framework. Emerging themes from interviews were systematized and used to create a coding framework, which was then applied to interview transcripts during tagging, following the procedures outlined by Gale et al. (2013). Certain themes, such as infrastructure data and process challenges, were identified in advance, while others were recognized during transcript coding, such as the identification of bottlenecks in the process cycle. The coding and tagging of transcripts were done by a multi-disciplinal team of researchers.

Box 1 provides an overview of the classroom construction project cycle based on official government issuances and our key informant interviews. Public classroom construction may be divided into four major phases that include planning, procurement, construction, and maintenance. Based on our interviews, process bottlenecks identified by our key informants are largely in the planning phase (60%) of the construction project cycle as shown in Figure 4.

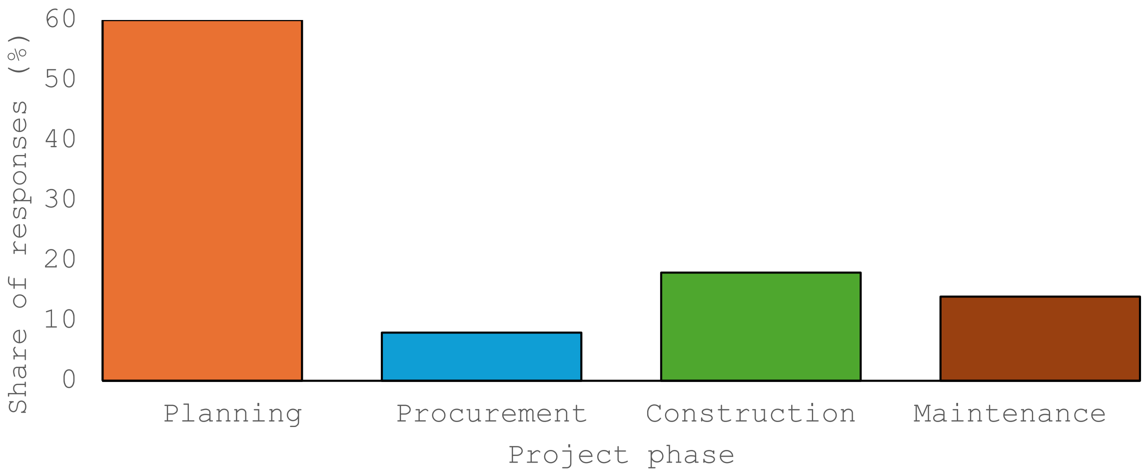
These issues may be informational, e.g. data silos and information mismatch; managerial, e.g. jurisdictional ambiguity and poor coordination; technical, e.g. soil testing and structural design; and even administrative, e.g. incomplete documentation. The rest of the identified issues are spread among other project phases: procurement (8%), construction (18%) and maintenance (14%). A more detailed frequency tabulation of reported bottlenecks by project phase and reporting agency is presented in Table 4. We highlight some of these issues below.

Coordination issues and information failures

Many interview respondents have expressed difficulty in obtaining critical information that can be otherwise provided by other agencies based on specialized in-house databases, such as DepEd's NSBI and Basic Education Information System (BEIS), and the DPWH's Construction Materials Price Data (CMPD), as mandated by DepEd Order No. 01 s. 2017 and DPWH Order No. 01 s. 2023, respectively. The streamlining and allocation of tasks to different agencies, including DepEd spearheading the drafting of the proposal and assessing the demand for new classrooms, DPWH being the primary implementing arm for facilities construction, and NEDA serving as monitoring agency that ensures alignment to regional and national development plans, may have contributed to the creation of information silos that exacerbated the inaccessibility of these agencies to pertinent information. The agencies have developed their own system of guidelines that, though beneficial to their own workflow, may have inhibited coordination with external partners. An example of such informational issues is the difference in indicative costs of classroom construction for planning purposes, which is pegged by the DPWH at PhP3.5 million per classroom but at a lower PhP2.5 million rate by DepEd.

Another example is the inconsistent standard guidelines used by agencies for construction. DPWH primarily utilizes the Standard Design Plans they have released in 2018 and has not indicated whether the drawings are consistent with DepEd's own Minimum Performance Standards and Specifications for DepEd School Buildings (DepEd Orders 64 s. 2017 and 06 s. 2021). A respondent additionally shared that the Standard Design Plans contain insufficient specifications, thus requiring engineers to separately consult the National Structural Code of the Philippines (NSCP) for rebar details in the columns, construction joints, and the like. "*Hindi lahat fully specified*" says a respondent, "*like 'yung mga sprinkler, sa mga water tank, mga components niya*."

Table 4. Share of responses on project cycle bottlenecks by phase



Source: Authors' calculations.

Box 1. Public classroom construction process cycle

DepEd Order No. 35 s. 2017 or the "*Revised guidelines on the implementation of the Basic Educational Facilities Fund* outlines the procedures and requirements for the construction, repair and rehabilitation of school facilities using the Basic Education Facilities Fund (BEFF). It was later superseded by DepEd Order No. 18 s. 2023 or the "*Revised multi-year guidelines on the allocation, receipt, utilization, monitoring, and reporting of the basic education facilities funds*" upon redefining the scope of the School Building Program.

The project cycle can be segmented as such:

(a) Planning involving tasks related to preliminary investigations, preparation of pre-construction documents, projection of demands and needs;
(b) Procurement comprising the acquisition of materials and services, including the entire bidding process, from posting of notices to opening of bids to the awarding of notice to the winning contractor;
(c) Construction of rooms and facilities by the contracting company; and
(d) Maintenance upon completion and utilization of delivered facilities, including impact monitoring, and repairs and rehabilitation.

The DepEd School Division Offices prepare the Comprehensive School Facilities Development Plan (CSFDP) containing the development plans of school sites in the next five year. This plan is updated regularly with the collaboration of local government units and other stakeholders. Utilizing the NSBI and BEIS, DepEd projects the number of classrooms needed by using enrollment data, migration rates, drop-out rates and fertility rates with around two percent conservative leeway. Site assessment, involving physical, technical, and environmental inspection and feasibility studies, is conducted alongside DPWH engineers to ensure the viability of the location for construction. The plans are endorsed by the local Regional Development Council and are forwarded to the DepEd Central Office for consolidation. The final proposed budget for the School Building Program is then presented to Congress. Upon approval of the budget, DPWH takes over in implementation, including facilitating the procurement process, following procedures stated in Republic Act 9184 or *Government Procurement Reform Act*, and its construction by the contracting company until eventual turn-over to DepEd for utilization and maintenance.

The roles and responsibilities of both parties are defined in a Memorandum of Agreement between DepEd and DWPH enclosed in DepEd Order No. 18 s. 2023. Despite delineation of tasks, DepEd and DPWH are expected to conduct joint assessments with proper procedure dictating documentation to be done for compliance and monitoring.

The duration of the project cycle varies depending on the size and complexity of the project. We found no information on the duration of the planning phase, but this could extend indefinitely depending on context, e.g. such as when new construction site is unavailable. On the other hand, the duration for procurement can be as short as 36 days and last up to 160 days (DPWH, 2005). Construction can also vary from 45 days for a single classroom to 360 days for larger infrastructure projects. On average, a single-storey, one-classroom building can be constructed within 45 to 90 days, with the whole process of planning to construction averaging 17 months according to a key informant. The rest of the useful life of a facility, including the rehabilitations and repairs, falls in the maintenance phase.

Source: Authors' compilation.

Table 5. Frequency of responses on project cycle bottlenecks by phase and agency

	Frequency of responses			
	DepEd	DPWH	NEDA	Total
A. Planning				
Information issues affecting cost and demand projection				
Information inaccessibility due to siloed systems	5	1	5	11
Mismatch of costing between DepEd and DPWH	2	2	1	5
Management and Coordination				
High disapproval rate of projects	5	2	...	7
Low absorptive capacity of agency	4	...	3	7
Inconsistency/ambiguity in jurisdiction	3	2	2	7
Lack of coordination with another agency	3	...	1	4
Quality monitoring and validation				
Difference in guidelines or requirements	1	3	4	8
Mismatch in reports of agencies during validation	2	3	1	6
No soil testing conducted prior to construction	3	...	1	4
Standardized design not appropriate for site	1	...	1	2
Documentation				
Site unavailable (no site ownership or land titles)	3	4	1	8
Incomplete pre-construction documentation	1	...	1	2
B. Procurement				
No bidders for projects	1	...	1	2
Variation or fluctuation in material pricing	3	4	1	8
C. Construction				
Modifications				
Adjustment of engineering plans and program of works	3	3	2	8
Area requires extensive rework or preparation	1	...	1	2
Project monitoring				
Lack of project monitoring during implementation	4	2	2	8
Turn-over process				
Turn-over documentation is insufficient or takes too long	2	...	1	3
D. Maintenance				
Risks and disaster response				
Exposure to calamities and disasters	1	...	1	2
Lack of coordination with DRRM	1	1	1	3
Insufficient funds or slow mobilization of repairs	2	1	...	3
Conflict-related risks	1	0	1	2
Prioritization of new construction over maintenance	5	1	...	6
E. Others				4
Services outside of scope, e.g. electrification and drainage	1	...	...	1
Availability of right-of-way	...	...	1	1
Delays in SARO release	...	1	...	1
Permit application takes too long	...	1	...	1
Number of interview sessions	6	6	5	17

Source: Authors' calculations based on interview transcripts. Note: … - not mentioned.

When asked regarding high disapproval rate of projects, one respondent shared "*Ang problema nun kasi pagdating na ng pondo, mga 30 to 35 percent lang siya [schools included in comprehensive development plan]… Dati kasi kahit lista lang, pwedeng maimplement 'yun o masama sa ranking. Ngayon meron nang Implementation Readiness*." This Implementation Readiness (IR) criteria includes soil testing, proof of lot security, and many other documentary requirements. The IR is used to determine which projects to prioritize for endorsement: a higher IR score gives greater priority. Both DepEd and NEDA agencies have implemented this feature, but one respondent shared that NEDA has a greater number of requirements, and sometimes the requirements of one agency are not directly translatable to requirements by others. "*'Yung pang LGU [document requirement] yung iba parang hindi need ng DepEd. Ang problema kung hindi kumpleto ang requirements sa IR, tinatanggal sa list o nirarank siya [low ranking]*".

A respondent has shared that their regional office crafts two proposals for classroom construction projects – one to be sent to the central office and another to the local Regional Development Council with the expectation that the latter submission will result with some of the projects being deprioritized if not outright removed from the list while the former maintains the entire project list. "*Parang dalawa 'yung proposal. Kung ano 'yung ma-aprub sa tentative application, doon namin pinapasok lahat kung ano 'yung proposal namin nang 100 percent.*"

Coordination failures may also contribute to project delay. For example, while Congress may have allotted specific budget for classroom construction and plans have already been made by DepEd, DPWH, and NEDA at the start of the fiscal year, the authority that allows agencies, e.g. DPWH, to incur obligations for projects and the actual release of funds require additional documentary requirements, e.g. joint request from DepEd and DPWH, and coordination with the Department of Budget and Management

<u>Limited monitoring</u>

Several respondents expressed concern with the limited inter-agency monitoring throughout the entire project cycle. For example, NEDA may have limited view of the project status since information reported in Regional Development Councils typically pertain only to basic statistics, such as the number of classrooms and project costs. Meanwhile, coordinated monitoring between DepEd and DPWH remains insufficient despite the necessitated participation of both parties in the form of joint validation and joint decision-making junctures as outlined in the MOA enclosed in DepEd Order No. 18 s. 2023. DepEd Orders 64 s. 2017 and 06 s. 2021 have specified the minimum performance standards expected of DepEd school buildings, of which some respondents expressed being unable to validate compliance in project implementation because of limited monitoring capacity. Some respondents noted that this may be due to the combination of influx of other government projects and limited number of personnel.

Other respondents noted the contractor's performance as a source of delay. There are however guidelines in place by DPWH that set a five percent slippage as a warning to the contractor and any greater than 15 percent may lead to termination of contract. In addition, contractors may request a time extension subject to the approval of DPWH. Otherwise if the contractors fail to meet the obligations at the set timeframe, the contractors incur liquidated damages.

Site location

The lack of available sites for new classroom construction is also a persistent issue that crops up during site validation and preparation of documents, according to our key informants. Construction is typically put on hold until documentary proof, i.e., a land title, is available. In high-density cities, such as in the NCR, available real estate is sparse and expensive. Local government units are responsible for the purchase of real estate for public school construction; private entities may also donate land to schools (Navarro, 2022). In high built-up areas, such as in high urbanized cities, electrical and sewerage systems are additional considerations in developing new project sites that require consultation with local utilities experts.

In remote locations, such as those that qualify for Last Mile Schools, site availability may be limited due to surrounding conditions of the area that oftentimes require greater site reworking, and in turn incurs further hauling costs. Hauling costs are also often cited during interviews as a prominent issue affecting the budgeting of the project. Intertwined with hauling costs are the material availability based on supplier distance that further drives up the price. Any requests for additional budget, or modifications in the engineering plans to accommodate either the allotment or schedule would require extra time to process and incur higher cost.

Variation in project specifications

The respondents noted that many classroom construction projects have been delayed by unplanned modifications to the program of works, such as changes in engineering plans brought about by unavailability of materials, project costs going beyond the budget, the project site not being the same as indicated in the plans upon validation, or unclear specifications that required drafting new plans. The project would then need variation orders for modifications that require massive budget differences, which may contribute to delays in classroom construction. "*Pag-propose ng program of works and tsaka yung design, yung mga plan kasi natin is prototype lang*," shares a respondent.

In cases where the soil is found to be muddy or to contain low bearing capacity, the foundation would require extra engineering rework to provide appropriate building foundation. This would typically incur further costs that may go beyond the initial budget for the project. Some DPWH offices include a buffer on the costing of building foundations during price analysis, while other offices requires the submission of a formal plan for modification to the central office. The latter scenario would warrant the halting of the operation until approval of the revised project plans. Additionally, other offices divide the project into phases, leading to a suspension of the project while they seek approval for variation orders.

For simpler modifications that have minimal cost implications, a respondent indicated that the engineer-in-charge may seek alternative sources of funding, such as the local governments' Special Education Fund (SEF) as suggested by one participant. However, the availability of the SEF is limited by the extent of real property tax collection by local government units (LGUs), and subject to the approval of the same.

Price changes

As shown by our duration analysis, it may take considerable time between the initial budget allocation and the eventual construction of classrooms. Many respondents noted that this often leads to higher actual project costs due to increases in the prices of input materials.

Respondents noted that in some cases when budgets are fully expended, classroom construction would have to stop until new financing sources are made available.Preference for new classroom construction over other facilities and maintenance

Construction and maintenance of school facilities other than classrooms have faced challenges when it comes to funding. One respondent shared that there are funded projectstypically for classroom construction, but not for other essential amenities. "*Kung tingnan natin sa site, 'yung halos other facilities ginagawang classroom. Kasi may access tayo na pondo or 'yung parang access program… nakalaan doon 'yung mga principal's office, 'yung mga pathway, security fence, administrative building. Hindi kasi 'yun napopondohan. May program tayong access pero hindi ito napopondohan.*" The respondents also shared that the classroom shortages may have contributed to school administrators' decision to repurpose other structures designed for other uses as makeshift classrooms.
Water, sanitation and hygiene (WASH) facilities are especially in need of constant maintenance work. "*'Yung maintenance kasi kahit may mga WASH facilities na tayo, may mga comfort room, and problema niyan halos walang maintenance kaya nasisira yung mga WASH facilities*" The school's MOOE provides the funds for school maintenance however the school may not be able to sustain it. "*Sufficient siya pero after one year, walang maintenance*." WASH facilities may be included in schools' repair schedules, but classroom repairs often take precedence.

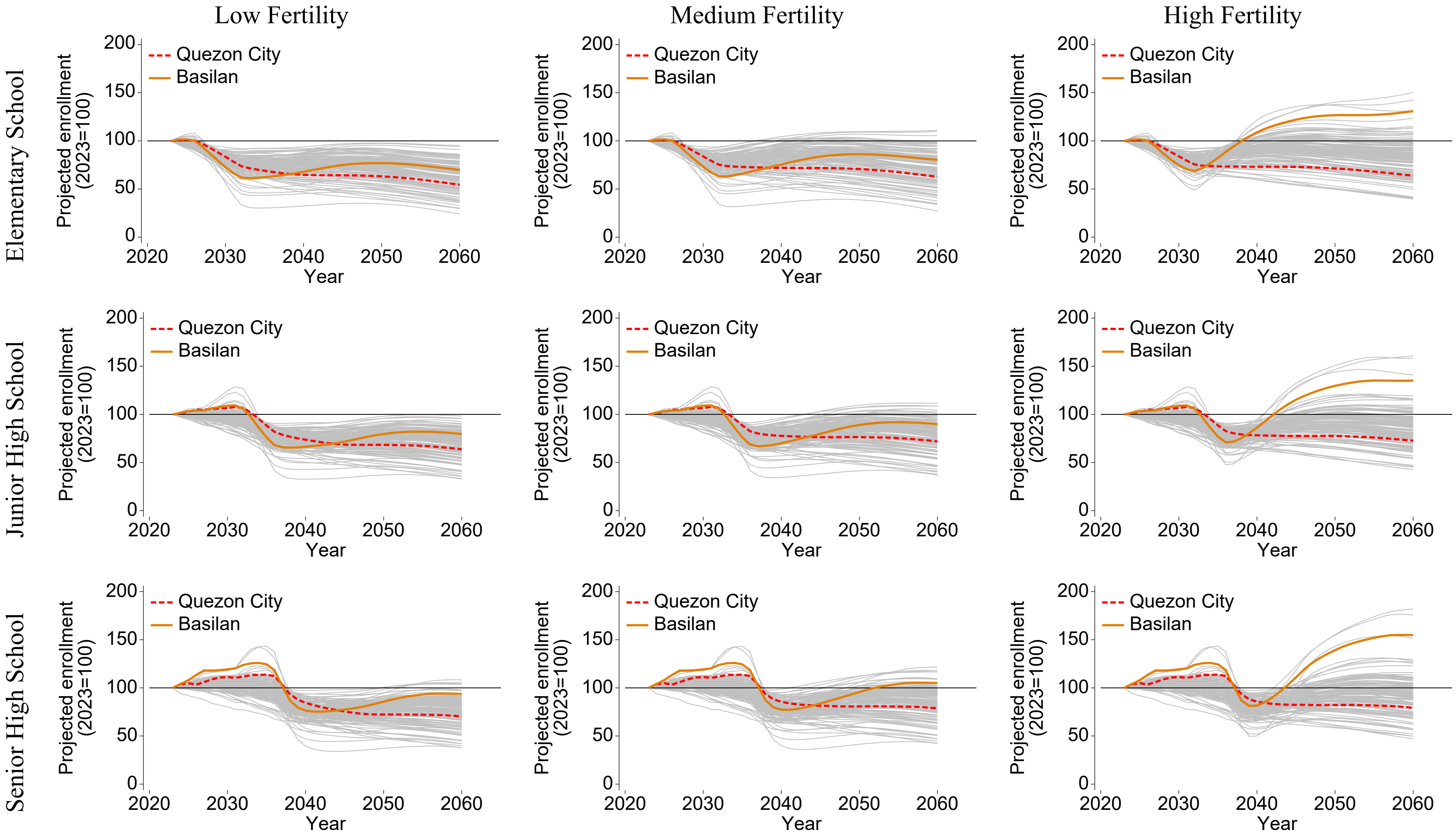
4. Low fertility and projected demand for public school classrooms

Increasing student enrollment is an important driver of public school congestion in the country. This has been primarily conditioned by the Philippines' relatively high historical fertility rates, although new education entitlements introduced over the last decade may have also contributed quite significantly. In 2011, for example, DepEd introduced a universal kindergarten education program, requiring students to attend kindergarten prior to enrolling in Grade 1, which was fully implemented starting in 2012 with the enactment of the Kindergarten Law (Republic Act [RA] 10157). In 2013, the Philippines adopted the K-12 Law (RA 10533) that added two years of senior high school (SHS) to the country's basic education system, with compulsory enrollment in SHS beginning in 2016.

However, this trend of increasing basic education enrollment is likely to reverse soon, as the country's fertility rate has recently fallen below the replacement level. In 2022, the country's total fertility rate (TFR) was at 1.9 births per woman (Philippine Statistics Authority [PSA] and ICF, 2023), which is below the conventional 2.1 replacement fertility rate. Following global experiences, it may be difficult for the Philippines to attain future fertility rates that are significantly beyond replacement level due to the reinforcing effects of different social, economic and demographic factors (c.f. Lutz, et al., 2006; Abrigo and Estopace, 2023).

We assess how declining fertility may affect the demand for public school classrooms by projecting the number of public school enrollees until 2060, from which we can estimate the number of public school classrooms needed in the future. In our population projections, we follow closely the methodology and scenarios employed in PSA (2024a), but applied separately to provinces and highly urbanized cities instead of the country as a whole. We assume that age-specific enrollment and progression rates by level would remain fixed at its 2022 level based on estimates from the 2022 Annual Poverty Indicators Survey (PSA, 2024b). Further details are provided as an Appendix.

Figure 6. Projected public school enrollment by level, scenario and province: 2023-2060



Source: Authors' calculations.

Figure 6 shows our projected annual public school enrollment normalized to 2022 levels by broad grade level and assumed national-level TFR: 1.7 (low), 1.9 (medium) and 2.1 (high). Each line in the figure represents enrollment projections for a particular location, wherein we highlight Quezon City and Basilan as examples. We note several results in our projections.

First, as may be expected, the projected levels of public school enrollment in high school, especially in the SHS, are not very much affected by our fertility scenarios in the near-term since these children have been born mostly prior to 2022. By 2040, based on our assumptions, we expect about 2.2 million public SHS enrollees, while that for public junior high school (JHS) ranges between 5.5- to 5.8 million, depending on the fertility scenario. These values are lower than the reported 2022 baseline public JHS and SHS enrollment at 7.3 million and 2.8 million students, respectively. Between 2022 and 2040, however, we expect total public high school enrollment to somewhat plateau with the expected increased enrollment in some areas, e.g. Quezon City and Basilan, offset by declining enrollment in others.

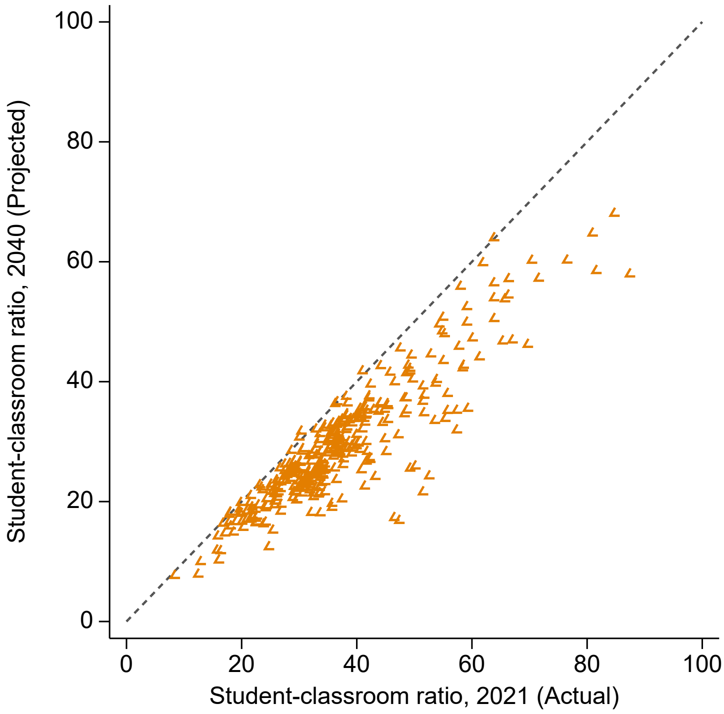
Second, total national public school enrollment in the elementary level is projected to generally decline over the next three decades despite population echo effects in some locations, such as in Basilan. By 2040, our projections point to public elementary school enrollment, including kindergarten, declining to around 10.5 million (low fertility) to 12.8 million (high fertility) from a baseline enrollment of around 14.0 million in 2022. We expect total public elementary school enrollment to decline further by 2060 across fertility scenarios, although some locations are projected to have public school enrollment higher by as much as half of baseline values in the high fertility scenario.

Third, the above adjustments in public school enrollment by level are expected to result in a generally declining trend in total public school enrollment across regions until 2040, totaling between 18.1 million (low fertility) and 21.1 million (high fertility) for the whole country by endline from 24.1 million in 2022. This trend is likely to continue until 2060 even in the high fertility scenario, except in BARMM where we project increased public school enrollment by around a third of baseline public school enrollment figures.

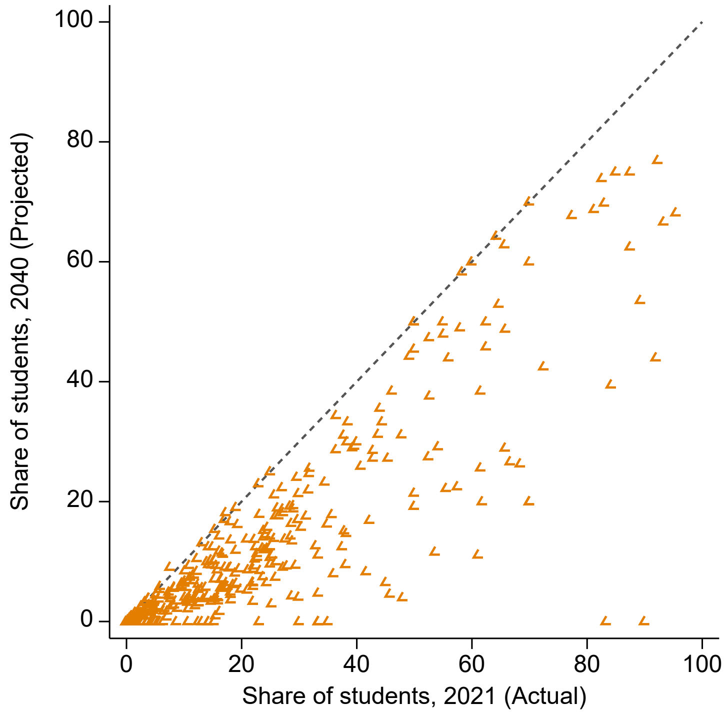
These trends may be a welcome opportunity to decongest public schools. In Figure 7, we compare median student-classroom ratios (Panel A) and share of students attending congested public schools (Panel B) observed in 2021 and projected to 2040 based on the medium fertility scenario. In each of these panels, we assume that the total number of usable public school classrooms remain the same at its 2021 level. By and large, Figure 7 shows a decline in public school congestion across the country by 2040, with some areas fully eliminating school congestion, even if the number of public school classrooms remain fixed. In terms of location, the median student-classroom ratios are projected to remain highest in NCR and surrounding provinces across all levels; and in Cebu, Occidental Mindoro, BARMM and Soccsksargen for high school, similar to observations for 2021, as shown in Figure 8.

The projected decline in public school enrollment as a result of low fertility may ease public school classroom deficits in the future under certain conditions. If the number of existing classrooms in 2021 are held constant until 2040, remaining classroom deficits are expected to range between 58,000 to 81,000, depending on fertility scenario (see Figure 9). However, if we factor in building wear and tear because of infrastructure ageing, the numbers are significantly higher at around 100,000 (low fertility) to 122,000 (high fertility). For the medium fertility scenario, classroom deficits in public elementary schools are projected to increase for some provinces, while those for public high schools will decrease as shown in Figure 10.

Figure 7. Public school congestion measures by level and province: 2021 and 2040
A. Median student-classroom ratio



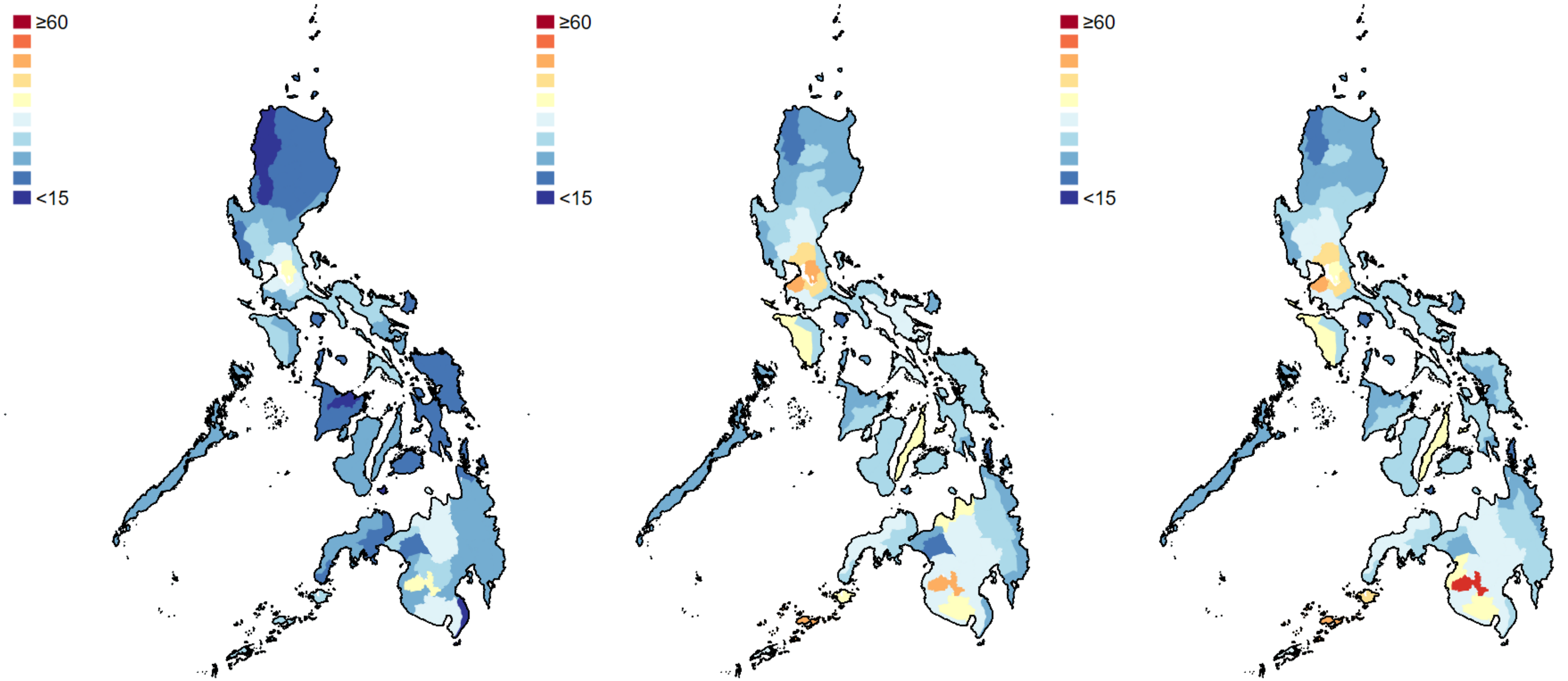
B. Share of students (%) enrolled in congested schools



Source: Authors' calculations. Note: Projected values are based on medium fertility scenario.

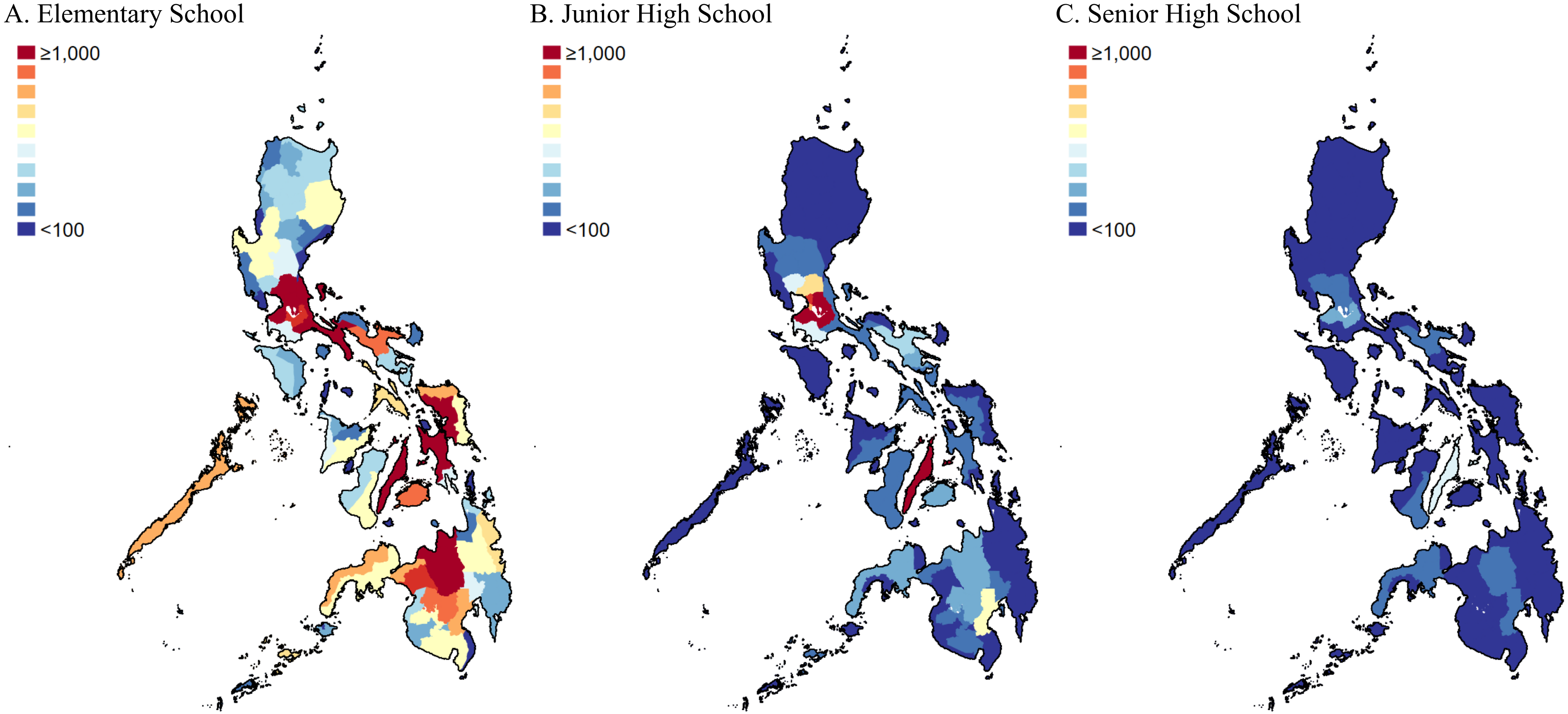
Figure 8. Projected public school median student-classroom ratio by level and province: 2040 medium-fertility demand with 2021 supply

A. Elementary School B. Junior High School C. Senior High School



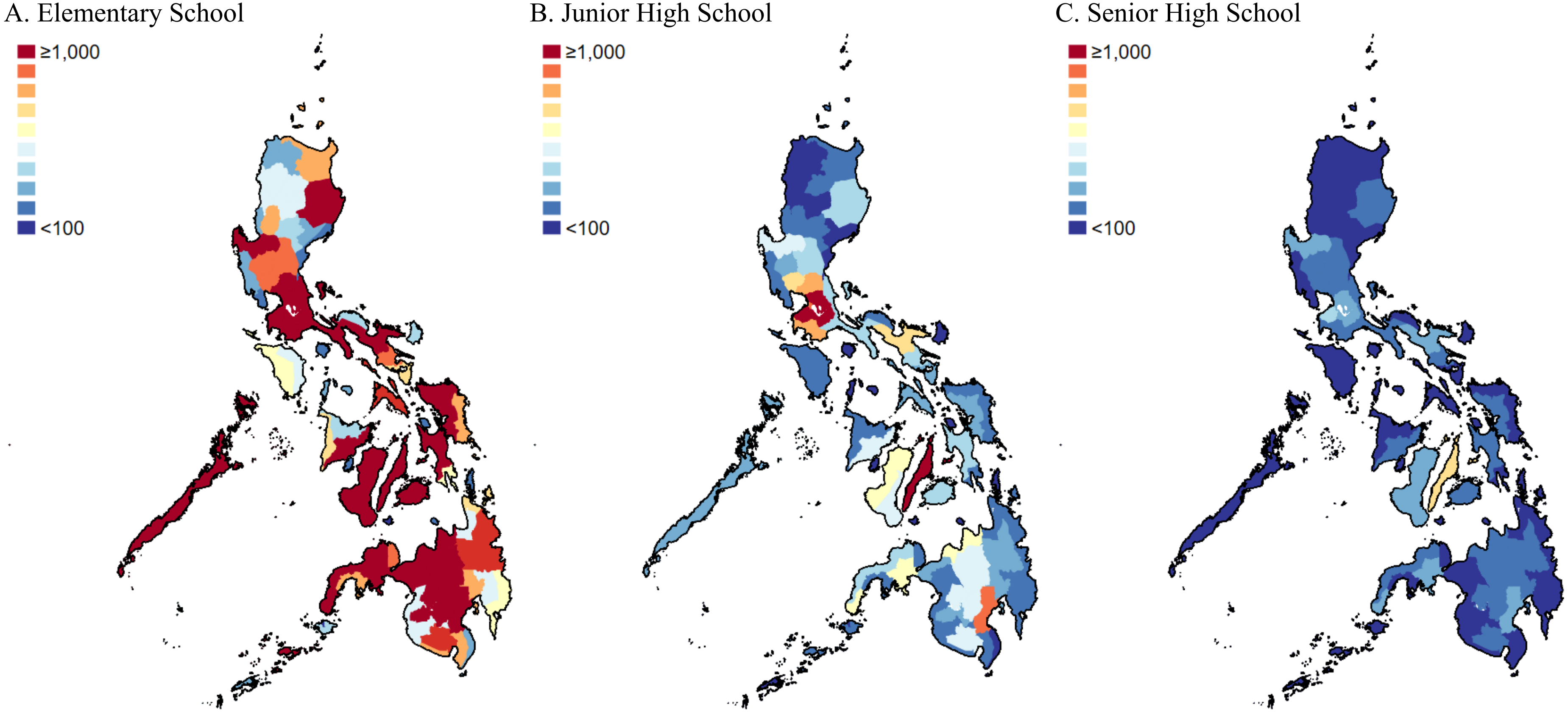
Source: Authors' calculations.

Figure 9. Projected public school classroom deficit by level and province: 2040 medium-fertility demand with 2021 supply



Source: Authors' calculations.

Figure 10. Projected public school classroom deficit by level and province: 2040 medium-fertility demand with ageing buildings



Source: Authors' calculations.

5. Policy implications

Classroom congestion has been a perennial concern among public schools across the country. In this study, we highlight several potential reasons that may have contributed to this issue, including those related to limited funding, natural and induced obsolescence, project cycle bottlenecks, and increasing demand. We document that a future with continuous low fertility presents an important tailwind to ease classroom congestion across the country, but headwinds from building obsolescence would require continuous infrastructure investments to address classroom supply deficits in the public school system.

Solutions to public school classroom congestion should recognize that the education sector's primary goal is to educate children, and that constructing classrooms is only one of the means towards this end. Surely, the government needs massive investments to address existing and looming classroom deficits in public schools. Based on our projections, the government needs to build between six to eight thousand new classrooms every year over the next 15 years to address classroom deficits by 2040. At PhP3 million per classroom, this translates to about PhP18- to PhP24-billion infusion through public school buildings annually, which is in the ballpark of what the government has been recently allocating for classroom construction.

But providing sufficient allocation on its own may not be enough. It is crucial to identify where and when the classrooms deficits will likely happen, which would require regular updating of projections of school enrollment and classroom supply, such as what we have demonstrated in this study. As we have shown here, the necessary input data and technology to do such projections are already available. This capability may need to be built into the government's planning machinery and be used to direct resources where they are most needed.

In addition, addressing bottlenecks in the classroom construction project cycle should be afforded greater attention. As we have documented here, majority of issues that had been identified were concerned about planning, which gives hints of possible directions for fruitful interventions. One possible action is to create a long-term School Building Construction Masterplan that identifies locations where classrooms will be needed based on supply and demand projections, and different building specifications most fit for identified zones across the country based on terrain and climatic conditions, among others. Other activities, such as funding prioritization, pre-construction activities, and even building maintenance may be built around such masterplan to facilitate planning. Ultimately, such interventions would not only require greater coordination and cooperation among concerned agencies, particularly DepEd, DPWH, and NEDA, but also the availability of skilled personnel to implement them.

There may be other options beyond building more classrooms. For example, the government may hedge on the differential timing and spatial distribution of classroom congestion across grade levels. Mechanisms to share excess classrooms in nearby schools with those schools in deficit may be explored as a stop gap measure. Such framework should include instruments to compensate schools with excess classrooms for the use of their resources, as well as policies on safety and security of the school community.

Encouraging greater private sector participation may also be an important future direction to address public school classroom deficits. These may include public-private partnerships in the construction of classrooms, e.g. through build-lease-transfer schemes, or in the enrollment of public school students in private schools, e.g. through education service contracting or voucher programs. This may also include government-subsidized transportation services that would allow students to enroll in relatively uncongested but more distant schools to facilitate greater use of already available resources. The costs of these options need to be weighed relative to the benefits it could provide. Such analyses should include not only actual direct financial costs and benefits to government and households, but also the opportunity costs of alternatives to society at large.

References

Abrigo, M.R.M., and K.M.M. Estopace (2023). What drives female fertility in the Philippines? Evidence from 50 years of National Demographic and Health Surveys. IDS Discussion Paper Series No. 2023-19. Quezon City, Philippines: Philippine Institute for Development Studies.

Adair, T. and A.D. Lopez (2018). Estimating the completeness of death registration: An empirical method. *PLOS ONE*, 13(5): e0197047.

Baltchford, P. (2003). *The class size debate: Is small better?* Maidenhead, UK: Open University Press.

Barrett, N. and E.F. Toma (2013). Reward or punishment? Class size and teacher quality. *Economics of Education Review*, 35, 41-52.

Betts, J.R., and J.L. Shkolnik (1999). The behavioral effects of variations in class size: The case of math teachers. *Educational Evaluation and Policy Analysis*, 21(2), 193-213.

Bowne, J.B., K.A. Magnuson, H.S. Schindler, G.J. Duncan, H. Yoshikawa (2017). A meta-analysis of class sizes and ratios in early childhood education programs: Are thresholds of quality associated with greater impacts on cognitive, achievement, and socioemotional outcomes? *Educational Evaluation and Policy*, 39(3), 407-428.

Bruhwiler, C. and P. Blatchford (2011). Effects of class size and adaptive teaching competency on classroom processes and academic outcome. *Learning and Instruction*, 21(1), 95-108.

Datta, S. and G.G. Kingdon (2023). Class size and learning: Has India spent too much on reducing class size? *The World Bank Economic Review*, 37(1), 24-48.

Dee, T.S., and M.R. West (2011). The non-cognitive returns to class size. *Educational Evaluation and Policy Analysis*, 33(1), 23-46.

Dieterle, S.G. (2015). Class-size reduction policies and the quality of entering teachers. *Labour Economics*, 36, 35-47.

Gale, N.K., G. Heath, E. Cameron, S. Rashid, and S. Redwood (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, 13, 117.

Guerrero, M.A., Y. Villacampa, and A. Montoyo (2014). Modeling construction time in Spanish building projects. *International Journal of Project Management*, 32(5), 861-873.

Hallaq, S. (2024). Class size reduction, bullying, and violent behavior: Evidence from West Bank schools. *Bulletin of Economic Research*, 76(2), 545-595.

Kumaraswamy, M.M., and D.W.M. Chan (1995). Determinants of construction duration. *Construction Management and Economics*, 13(3), 209-217.

Lutz, W., V. Skirbekk, and M.R. Testa (2006). The low-fertility trap hypothesis: Forces that may lead to further postponement and fewer births in Europe. *Vienna Yearbook of Population Research*, 4, 167-192.

Molnar, A., P. Smith, J. Zahorik, A. Palmer, A. Halbach, and K. Ehrle (1999). Evaluating the SAGE Program: A pilot program in targeted pupil-teacher reduction in Wisconsin. *Educational Evaluation and Policy Analysis*, 21(2), 165-177.

National Economic and Development Authority (2023). Philippine Development Plan, 2023-2028. Accessed on 15 March 2025 from https://pdp.neda.gov.ph/wp-content/uploads/2023/09/Philippine-Development-Plan-2023-2028.pdf

Navarro, A.M. (2022). School infrastructure in the Philippines: Where are we now and where should we be heading? PIDS Discussion Paper Series No. 2022-10. Quezon City, Philippines: Philippine Institute for Development Studies.

Philippine Statistics Authority (2023). 2020 Census of Population and Housing. Public-use micro-database. Accessed on 18 June 2024 from https://psada.psa.gov.ph/catalog/231

Philippine Statistics Authority (2024). Philippine population is projected to be around 138.67 million by 2055 under Scenario 2. Accessed on 23 November 2024 from https://psa.gov.ph/content/philippine-population-projected-be-around-13867-million-2055-under-scenario-2

World Bank and Australian AID (2012). *Philippines: Basic education public expenditure review*. Washington, D.C., and Canberra, Australia: The World Bank and Australian AID.

Appendix A. Projection of public school classroom supply by condition

School room quality in the 2023 DepEd National School Building Inventory (NSBI) was modelled using ordered logistic regression. In an ordered logistic model, we estimate a latent score and a set of thresholds that jointly determine the probability of an observation being in a specific class of an ordinal variable outcome. For simplicity, we regrouped the original five-class school room quality in the 2023 NSBI (i.e., condemned, for condemnation, needs major repair, needs minor repair, in good condition) into three larger classes, namely, condemned/for condemnation, needs repair, and in good condition. We include as explanatory variables several building-specific characteristics (e.g. number of floors, building age, materials used, financing sources, repair history, etc.) as well as school-specific attributes (e.g. school size, curricular offering, location, and school type).

We project the probability that each school building is in good condition in 2040 by adjusting building-specific age to reflect the target endline. We assume that all other attributes remain the same. We then aggregate these values for each school by weighting the estimated probability by the respective number of rooms for each school building. We apply this school-level proportion to the number of classrooms reported in 2021 to estimate the number of classrooms that remain in good condition for each school by 2040.

Appendix B. Projection of public school classroom demand and deficits

We project the number of public school enrollees by level and location using standard cohort-component method as follows:

$$E_{ilt} = \sum_{a} P_{la}\, N_{at} = \sum_{a} P_{la}\left(N^{s}_{a-1,t-1} + B_{at} + M_{at}\right)$$

where E_{ilt} is the projected number of public school students enrolled in level $l = \{K, 1,2, \dots, 10\}$ in location i and period t, which we estimate by aggregating the product of age-specific enrollment rate by level, P_{la}, and projected age-specific population, N_{at}, across all age groups $a = \{0,1, \dots A\}$. Population age distributions, on the other hand, are projected by summing estimates of surviving population $N^{s}_{a-1,t-1}$, newborns B_{at} (for age zero), and net migrants M_{at} by age.

In our projection, we assume that age-specific enrollment rates by level are fixed at its national baseline values based on estimates from the 2022 Annual Poverty Indicators Survey (APIS) by the PSA (2024). Ultimately, these enrollment rates capture timing differences in school entry, progression and exit across cohorts. In the 2022 APIS, current school enrollment status and specific level attending are asked only among those aged 3 to 24 years. We assume zero enrollment rate for age groups outside this range.

Each component of the age-specific population projection is estimated separately by generally following the procedures and assumptions used in the official national population projections by the PSA (2024b). We applied these procedures to each of the provinces and highly urbanized cities in the Philippines.

A key difference is on how we incorporate migration. In our projections, we include domestic migration, which nets out to zero for a national estimate, like that by the PSA. In our model, we estimate the annualized share of population that migrated from domestic location i to domestic location j using the 2020 Census of Population and Housing (PSA, 2023), which we assume to remain fixed throughout our projection horizon. In addition, we use fixed annual international migration rates by age estimated from the 2020 census of population and international migration data from the Commission on Filipinos Overseas. This departs from the PSA official methodology that raise net international migration by ten-percent every five years starting in 2020 (PSA, 2024a).

Location- and age-specific lifetables were estimated using vital registration data and population census counts. We smooth the number of deaths by age using three-year averages centered at the census year. We adjust the mortality figures for potential under-reporting using Lopez and Adair's (2018) empirical completeness methodology. We assume that the implied mortality age schedules in the lifetables remain fixed throughout our projection horizon. The resulting enrollment projections are very similar regardless of whether we adjust for death registration completeness or not since much of the adjustment are for older populations, which do not matter as significantly in school enrollment. We report the unadjusted figures in this study, but the adjusted projections are available from the authors upon request.

The number of newborns is estimated by applying age-specific fertility rates (ASFR) to the population age distribution of women in each location. We estimate initial ASFRs by combining births data from PSA's vital registration database with age-specific population of women in the 2020 population census. Similar to the lifetable calculations above, we smooth the number of births by using three-year averages centered at the census year.

We assume three different fertility scenarios in our projections following PSA's (2024a) official national population projections. In a low fertility scenario, we assume that the national total fertility rate (TFR) will linearly decline from the baseline 1.9 births per woman in 2022 to 1.7 in 2030, which we set to remain the same thereafter. In a high fertility scenario, we assume that it will instead linearly increase to 2.1 births per woman in 2030 and remain constant throughout. Finally, we have a medium fertility scenario wherein we assume that the national TFR would remain constant at 1.9 births per woman over our projection horizon. Location-specific ASFRs are scaled proportional to locational TFRs through raking to ensure that resulting national TFRs match our assumed TFR scenarios across time.

We estimate school-specific enrollment by applying location-specific growth rates in public school enrollment by level. From this school-level enrollment projections, we then estimate the required number of classrooms using a 1:50 norm by applying the Maimonides rule for each school and broad level (i.e., elementary, JHS, SHS) pair. Since we do not estimate specific grade level enrollment by school, we apply a bridge equation estimated from 2021 data that links estimated classroom demand similarly estimated as above and one that is estimated based on specific grade level enrollment, which provides a more accurate estimate of actual classroom demand in each school. We compare school-specific classroom supply and demand projections to estimate school-level classroom deficits. Finally, we aggregate these estimates at the province level for reporting.