PISA 2022

REPORT EVIDENCE FROM LEBANON

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Introduction

In the global educational landscape, assessments serve as crucial tools for evaluating the quality and the effectiveness of educational systems. The Programme for International Student Assessment (PISA), conducted by the Organisation for Economic Co-operation and Development (OECD), goes beyond conventional evaluation methods, focusing not just on students' accumulation of academic knowledge but also on their practical application of this knowledge in areas such as mathematics, reading, and science. This report will focus on the results of the PISA 2022 assessment, with a comprehensive overview of the performance of students in Lebanon and with a comparison with the international indicators.

PISA, which is implemented every three years since 2000 (being postponed from 2021 to 2022 as a result of the outbreak of the COVID-19 pandemic), places specific importance on the evaluation of critical thinking and problem-solving. The objective is not only to assess how well students can memorize information but, more crucially, to measure their ability to apply this knowledge in real-world scenarios. This developed and comprehensive perspective not only enriches the evaluation process, but also provides a more nuanced understanding of educational effectiveness in a rapidly changing world.

By offering a comparative analysis of educational systems on an international scale, PISA has become a tool to provide data-based insights into the strengths and areas requiring improvement of diverse approaches to education. Policymakers, educators, and researchers leverage these insights not only to evaluate overall academic achievement but also to inform decisions that foster positive changes. PISA, in this sense, emerges as a dynamic instrument for shaping the trajectory of education worldwide.

The outbreak of the COVID-19 pandemic has caused significant disruptions on education globally. These disruptions caused by the pandemic further highlight the critical role of assessments like PISA in evaluating the adaptability and resilience of education systems in the face of unpredictable challenges. In the context of the PISA 2022 report, the examination of educational outcomes post-pandemic becomes relevant and crucial for shaping future

educational strategies. Therefore, the evaluation of PISA 2022 outcomes and trends is of significant importance as an instrument for understanding how education systems navigate and recover from the challenges brought about by the pandemic.

This report examines various dimensions of the educational landscape in Lebanon. In addition to comparisons of students' scores in mathematics, reading, and science with the OECD average, the analysis also extends to further investigate the possible determinants influencing academic success, and the variables that are associated with increased student performance. In this respect, the aim is to understand the type of factors that contribute improved student achievement. Thus, this analysis considers the characteristics of these determinants, providing a comprehensive and context-specific perspective on the dynamics of education in Lebanon, and how the country can improve the quality of education provided to its students.

The first chapter provides an introduction on PISA and how it was implemented in 2022 internationally and in Lebanon. The second chapter describes the PISA frameworks for mathematics (2022), reading (2018), and science (2015). The third, fourth, and fifth chapters examine the performance of Lebanese students in mathematics, reading, and science respectively, comparing the country with the OECD average on a number of indicators including mean performance, students at different proficiency levels, gender gaps, and socioeconomic determinants. The sixth chapter provides further evidence, by examining the trends observed in Lebanon between 2015 (the first year of participation of the country in PISA) and 2022, with further analyses on the impact of the pandemic and school clusters. The final chapter summarizes the main findings and provides policy recommendations. The Appendix includes raw data from OECD with the indicators used in this report.

Chapter 1. PISA 2022 in Lebanon

WHAT IS PISA

The Programme for International Student Assessment, commonly known as PISA, is a prominent international student assessment program managed by the Organisation for Economic Co-operation and Development (OECD). PISA aims to provide comprehensive insights into the educational performance and capabilities of 15-year-old students across participating countries and regions. PISA surveys students' competencies in the educational domains of reading, mathematics, and science. The program operates on a triennial cycle, having assessed student performance every three years since its inception in 2000. This periodicity facilitates the tracking of educational trends over time and informs ongoing improvements in education as educational systems adapt to new challenges.

PISA plays a pivotal role in evaluating the skills required for active participation in society, and it assesses how students apply these essential skills to address real-life challenges, whether in the workplace or other aspects of life. PISA's assessment framework draws inspiration from various countries' educational curricula and emphasizes the development and measurement of reasoning abilities, effective interpretation, and the presence and effectiveness of analytical skills. The three main educational domains evaluated by PISA are:

1. Mathematics literacy: This domain assesses students' capacity to articulate, employ, and construct mathematical concepts across various contexts. It extends beyond calculations, emphasizing the ability to reason mathematically and apply mathematical tools, procedures, facts, and concepts to explain, justify, and predict natural phenomena.
2. Science literacy: This domain evaluates students' ability to engage with issues related to science and core concepts of scientific thinking as informed citizens. It defines scientifically literate individuals as those capable of participating in well-reasoned discourse regarding science and technology, involving competencies such as scientifically explaining phenomena, assessing and formulating scientific inquiries, and interpreting data and evidence within a scientific context (OECD, 2017).

3. Reading literacy: This domain assesses students' capability to comprehend, employ, evaluate, contemplate, and interact with a variety of texts, all aimed at achieving personal objectives, increasing knowledge and potential, and enabling active participation in society.

Each of these domains undergoes a detailed evaluation once every three years in the PISA assessment. Notably, the central domain for PISA 2022 is mathematics. The program adapts to global events, with the 2021 PISA round postponed to 2022 due to the challenges posed by the COVID-19 crisis. This delay attempts to ensure the accuracy and fairness of the evaluation under exceptional circumstances.

To achieve a comprehensive view of student performance while ensuring efficient data collection, PISA employs a sample-based assessment method, selecting representative samples instead of assessing all students within a country. This approach enables valid comparisons across countries while minimizing the burden on educational systems. In addition to core assessments, PISA includes contextual questionnaires that collect information about students' backgrounds, experiences, and learning environments. These questionnaires offer valuable context for interpreting assessment results, shedding light on factors influencing student performance, such as socio-economic background and school environment.

PISA results are presented through an international benchmarking system, facilitating global comparisons of educational performance. This benchmarking system ranks countries and regions based on their student performance in various subjects and competencies, enabling policymakers and educators to assess their educational systems' relative strengths and weaknesses.

PISA stands out for its unique approach to evaluating student performance. Unlike traditional assessments focused solely on academic knowledge, PISA takes a cross-cultural perspective, assessing students' abilities not only in terms of what they know but also how effectively they can apply their knowledge and skills in real-life situations. This approach allows for the comparison of educational outcomes across diverse cultural and linguistic backgrounds, promoting a broader understanding of global education. PISA evaluates not only traditional academic subjects like reading, mathematics, and science but also students' collaborative

problem-solving proficiency and their ability to apply knowledge in real-world scenarios. This multidimensional approach reflects the multifaceted skills students need to thrive in a rapidly changing world.

PISA serves as both an assessment tool and a source of evidence-based policy insights. Participating countries use PISA data to identify areas for improvement in their education systems, fostering informed decision-making and accountability in education policy and practice. To ensure the validity and reliability of its assessments, PISA maintains a rigorous quality assurance process, including careful pretesting of items, extensive statistical analyses, and thorough reviews (OECD, 2019).

PISA focuses on 15-year-old individuals actively enrolled in educational institutions. This group comprises students attending schools or other educational providers in grades seven or higher. During the PISA test, these students should fall within the age range of 15 years and three months to 16 years and two months. Specific thresholds for response rates at both the school and student levels are set by the PISA consortium to ensure sample representativeness. PISA's primary objective is to enable cross-country comparisons of student performance at age 15, a critical stage that in most educational systems marks the end of compulsory education (OECD, 2019). Consequently, PISA offers valuable insights into the effectiveness of education systems worldwide in equipping students with the essential skills and knowledge needed for success in further education, the labor market, and effective civic engagement.

PISA has been conducted seven times, with many countries participating in multiple assessments (OECD, 2023a). This extensive dataset allows for a comprehensive analysis of trends in student performance over time. The 2022 edition of PISA allows Lebanon to gather its first trends over three editions, and for most countries it offers the opportunity to compare performance trends over more than twenty years. These findings reveal that student performance has generally remained stable in most countries over the years, with occasional instances of notable improvement or decline (OECD, 2023a). These trends underscore the complexity and diversity of educational systems worldwide, emphasizing the ongoing need for efforts to enhance learners' educational experiences and outcomes.

COUNTRY PARTICIPATION, SAMPLING, RESPONSE RATES, AND POPULATION

In the PISA 2022 assessment, a total of 81 countries and economies were covered, an increase of two from the previous evaluation in 2018. This inclusive list comprised all 37 OECD country members and partners, along with entirely new participating nations. Over the period from the inaugural PISA 2000 edition to PISA 2018, the number of countries involved in the assessment expanded from 43 to 79. Notably, the 2022 edition saw the participation of more than 620 thousand students in total, a representation of approximately 35 million 15-year-olds in the countries taking part in the assessment, and nearly 32 million students of the same age. Table 1.1 below provides a comprehensive overview of the countries that participated in PISA 2022, specifically highlighting OECD member countries, whose results contribute to the benchmarking OECD average utilized in PISA reports.

Table 1.1. Countries participating in PISA 2022 and participating students

Country	OECD country	Participating students	Country	OECD country	Participating students
Albania	No	6129	Latvia	Yes	5373
Argentina	No	12111	Lebanon	No	5287
Australia	Yes	13437	Lithuania	Yes	7257
Austria	Yes	6151	Macao (China)	No	4384
Baku (Azerbaijan)	No	7720	Malaysia	No	7069
Belgium	Yes	8286	Malta	No	3127
Brazil	No	10798	Mexico	Yes	6288
Brunei Darussalam	No	5576	Moldova	No	6235
Bulgaria	No	6107	Mongolia	No	6999
Cambodia	No	5279	Montenegro	No	5793
Canada	Yes	23073	Morocco	No	6867
Chile	Yes	6488	Netherlands	Yes	5046
Chinese Taipei	No	5857	New Zealand	Yes	4682
Colombia	Yes	7804	North Macedonia	No	6610
Costa Rica	Yes	6113	Norway	Yes	6611
Croatia	No	6135	Palestinian Authority	No	7905
Cyprus	No	6515	Panama	No	4544
Czechia	Yes	8460	Paraguay	No	5084
Denmark	Yes	6200	Peru	No	6968
Dominican Republic	No	6868	Philippines	No	7193
El Salvador	No	6705	Poland	Yes	6011
Estonia	Yes	6392	Portugal	Yes	6793
Finland	Yes	10239	Qatar	No	7676
France	Yes	6770	Romania	No	7364

Georgia	No	6583	Saudi Arabia	No	6928
Germany	Yes	6116	Serbia	No	6413
Greece	Yes	6403	Singapore	No	6606
Guatemala	No	5190	Slovakia	Yes	5824
Hong Kong (China)	No	5907	Slovenia	Yes	6721
Hungary	Yes	6198	Spain	Yes	30800
Iceland	Yes	3360	Sweden	Yes	6072
Indonesia	No	13439	Switzerland	Yes	6829
Ireland	Yes	5569	Thailand	No	8495
Israel	Yes	6251	Turkiye	Yes	7250
Italy	Yes	10552	Ukrainian regions	No	3876
Jamaica	No	3873	United Arab Emirates	No	24600
Japan	Yes	5760	United Kingdom	Yes	12972
Jordan	No	7799	United States	Yes	4552
Kazakhstan	No	19769	Uruguay	No	6618
Korea	Yes	6454	Uzbekistan	No	7293
Kosovo	No	6027	Vietnam	No	6068

Source: OECD (2023b), Table I.A2.1

The pool of participants included a representative cross-section of 15-year-olds enrolled in educational institutions within each participating country. Specifically, PISA's sample includes students aged between 15 years and three months and 16 years and two months. Furthermore, practical non-participation on the evaluation day is a possible occurrence in most countries, and the reality that numerous 15-year-olds are not enrolled in any educational program contributes to variations in the coverage of the entire 15-year-old population across countries.

TESTING MODE, QUESTIONNAIRES, SAMPLING, AND IMPLEMENTATION OF PISA IN LEBANON

Similar to the previous editions in 2015 and 2018, the 2022 PISA assessment was predominantly conducted through computer-based tests in the majority of countries and economies. Only four nations opted for a paper-based version, limited to trend items from prior paper-based assessments (Cambodia, Guatemala, Paraguay, and Viet Nam). Lebanon also implemented the assessment in the paper-based version. The mathematics and reading sections of the framework employed a multi-stage adaptive approach, assigning students a block of test items based on their performance in preceding blocks. These test items encompassed both open-ended and close-ended questions, with each student undergoing a two-hour assessment in two

subjects. The electronic test forms distributed the full set of items among students, with some overlap to enable reporting on the same result scale. In addition to the competency survey, students spent approximately 35 minutes answering a questionnaire aimed at collecting information about their attitudes, dispositions, beliefs, homes, school experiences, and learning experiences. School principals also completed a questionnaire addressing school management and features.

Due to unusual circumstances following the COVID-19 pandemic, Lebanon implemented the paper-based version of PISA with reading as the main domain of assessment. The 2022 assessment in Lebanon was based on OECD PISA instruments developed for PISA 2018. This way the highest quality was assured in the times where piloting new testing instruments was not possible due to school closures. The sampling, testing, and analyses followed those developed for PISA 2018.

Table 1.2 provides details on the PISA 2022 sample in Lebanon. Overall, the sample size was 5287 students. In the assessment, 2313 students took the English version of the test (43.8% of the sample), and 2974 students took the French version (56.2% of the sample). Also, the sample included 2528 students from private schools (47.8% of the sample) and 2759 students from public schools (52.2% of the sample). The sample included around 62% of females and 38% of males. The final results were weighted to represent the proportions of 15-year-olds in each governorate and school sector (public/private), but also adjusting for the language of instruction (French or English) and gender. Thus, the final weighted results represent the target population of 15-year-olds enrolled in schools and eligible for PISA assessment.

Table 1.2. PISA 2022 student and school sample distribution across governorates in Lebanon

Governorate	Student sample size	School sample size	Share in the student sample
Akkar	382	23	7.2%
Baalbak	401	19	7.6%
Beirut	482	32	9.1%
Bekaa	357	22	6.8%
Mount Lebanon	2061	128	39.0%
Nabatieh	416	21	7.9%
North	698	39	13.2%
South	490	29	9.3%
Total	5287	313	100.0%

Source: PISA 2022 microdata

HOW TO INTERPRET PISA RESULTS

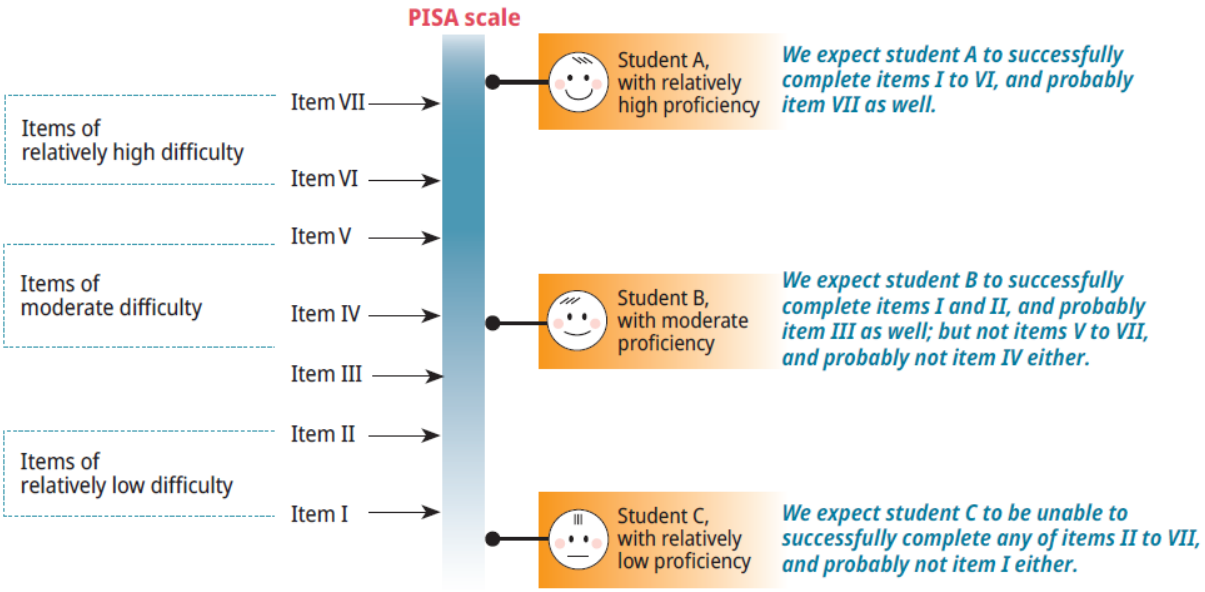
PISA generates achievement scores by carefully analyzing student responses to a large number of test items. These individual achievement measures are calculated using advanced psychometric modeling, predominantly based on Item Response Theory (IRT). Employing sophisticated statistical methodologies that consider both sampling and measurement errors, PISA aims to estimate results with the highest possible precision and reliability. The assessment includes a thorough two-hour examination, where diverse student groups encounter distinct sets of questions tailored to assess and score their performance across various educational domains. The complexity of PISA's sampling methodology ensures that the chosen sample accurately represents the larger target population.

The questionnaire utilized in PISA undergoes a rigorous process of item creation and revision, involving the development, testing, and refinement of test items by a substantial group of experts and consultants. Despite achieving high precision in the final results, it is crucial to acknowledge the potential presence of sampling and measurement errors. Sampling errors

emerge because PISA surveys only a subset of students, thus introducing variability. Measurement errors are linked to the inherent imprecision associated with the capacity of any single test to precisely measure student achievement. These errors are merged into a single measurement, known as the standard error, which plays a crucial role in PISA reports. The standard error captures the precision of the final results and evaluates the statistical significance of differences in outcomes. PISA typically employs a standard 95% confidence interval, signifying that if the study were replicated 100 times under the same methodology, approximately 95 of those replications would produce results closely resembling those reported.

The PISA assessment process revolves around utilizing student responses to test items to construct a single continuous scale with a dual purpose. This scale not only offers insights into student proficiency, but also indicates the difficulty level of the test items themselves. Estimating student proficiency involves considering the specific tasks students are expected to successfully accomplish. Students are more likely to provide correct answers to questions at or below the difficulty level associated with their position on the proficiency scale (Figure 1.2). In practical terms, "likely" denotes a probability threshold of at least 62%, signifying a relatively high likelihood of success. Conversely, students are less likely to respond correctly to questions positioned above the difficulty level associated with their proficiency on the scale. In this context, "unlikely" implies a probability below 62%, underscoring that such tasks pose a greater challenge for them.

Figure 1.2. Items difficulty and student proficiency.



Source: OECD (2023a), Figure I.1.3

Chapter 2. PISA assessment frameworks

The PISA framework offers a thorough and organized method for evaluating the knowledge and skills of students in the areas of the survey, specifically reading, mathematics, and science. Regarding the reading framework, PISA evaluates students' proficiency in comprehending, analyzing, and evaluating various text types. Beyond mere comprehension, it delves into how effectively students can employ reading as a tool for learning and navigating information-rich environments. The mathematics framework concentrates on testing students' mathematical literacy, covering their ability to apply mathematical concepts, reasoning, and problem-solving skills in real-world situations. Finally, the science framework assesses students' scientific literacy by scrutinizing their understanding of scientific concepts, ability to interpret data, and their capacity to engage in scientific inquiry.

The PISA frameworks extend beyond the assessment of classroom learning, aiming to gauge not only what students have acquired but also their ability to apply knowledge and skills in solving intricate problems, engaging in critical reasoning, and communicating effectively in various contexts, both academic and non-academic. By comprehending the characteristics of the PISA frameworks in reading, mathematics, and science, policymakers, educators, and stakeholders acquire valuable insights into the strengths and areas requiring further improvement of their educational systems. These insights can serve as a basis for evidence-based reforms and strategies to improve educational practices, ensuring that upcoming generations possess the skills and knowledge required to navigate the challenges and opportunities in their evolving world.

READING ASSESSMENT FRAMEWORK 2018

The PISA definition of reading literacy

The practice of reading in the contemporary era differs significantly from just a few decades ago. Until the mid-1990s, reading predominantly centered around tangible paper materials. Printed content manifested in diverse forms, ranging from children's books and extensive novels to pamphlets, encyclopedias, newspapers, magazines, scholarly journals,

administrative forms, and even notes on billboards (OECD, 2019). It is essential to notice that the advent of digital technology has mandated selectivity in reading choices, concurrently increasing the frequency and scope of reading for various purposes. In fact, reading and writing have started to substitute speech in everyday communication, such as the preference for utilizing chat systems over calling help desks (OECD, 2019). Consequently, readers must grasp these novel text-based practices.

The definitions of reading and reading literacy have evolved over time to reflect societal, economic, cultural, and technological shifts. Reading is no longer perceived merely as a skill acquired during childhood in the early years of schooling. Instead, it is seen as an expanding body of knowledge, skills, and strategies that individuals continue to develop throughout their lives in diverse contexts and through interactions with peers and the broader community. Thus, reading should be considered across the various ways in which citizens engage with text-based content, acknowledging its important role in lifelong learning.

According to the reading assessment framework from the PISA 2018 evaluation, reading literacy is defined as “understanding, using, evaluating, reflecting on and engaging with texts to achieve one’s goals, to develop one’s knowledge and potential and to participate in society”. The term "reading literacy" is employed instead of simply "reading" because it more precisely communicates to a non-expert audience what the survey seeks to measure. The term "reading" is frequently understood as a mere decoding process (such as converting written text into sounds) or even reading aloud. However, this evaluation aims to measure much broader and comprehensive constructs. Reading literacy encompasses a broad range of cognitive and linguistic abilities, spanning from basic decoding to knowledge of vocabulary, grammar, and the larger linguistic and textual structures necessary for comprehension. It also involves the integration of meaning with one's existing knowledge about the world. Furthermore, reading literacy includes metacognitive competencies, which entail the awareness and use of various appropriate strategies while processing texts. Readers activate these metacognitive competencies when they reflect on, monitor, and adjust their reading activities to achieve specific goals.

The term "understanding" is linked with the widely accepted concept of "reading comprehension", acknowledging that all reading involves integrating information from the text with the reader's pre-existing knowledge. Even at the earliest stages of reading, individuals must rely on their understanding of symbols (e.g., letters) to decode texts and their knowledge of vocabulary to derive meaning. However, this process of integration extends beyond basic decoding and can encompass the development of mental models that connect texts to the real world. A literate reader possesses not only the skills and knowledge to read proficiently but also values and utilizes reading for various purposes. Therefore, the goals of education encompass both reading proficiency and engagement with reading. In this context, engagement involves the motivation to read and comprises a cluster of affective and behavioral characteristics, including an interest in and enjoyment of reading, a sense of control over one's reading choices, participation in the social aspect of reading, and diverse and frequent reading practices (OECD, 2019). The phrases "to achieve one's goals" and "to develop one's knowledge and potential" both convey the idea that reading literacy empowers individuals to fulfill their aspirations and goals in life.

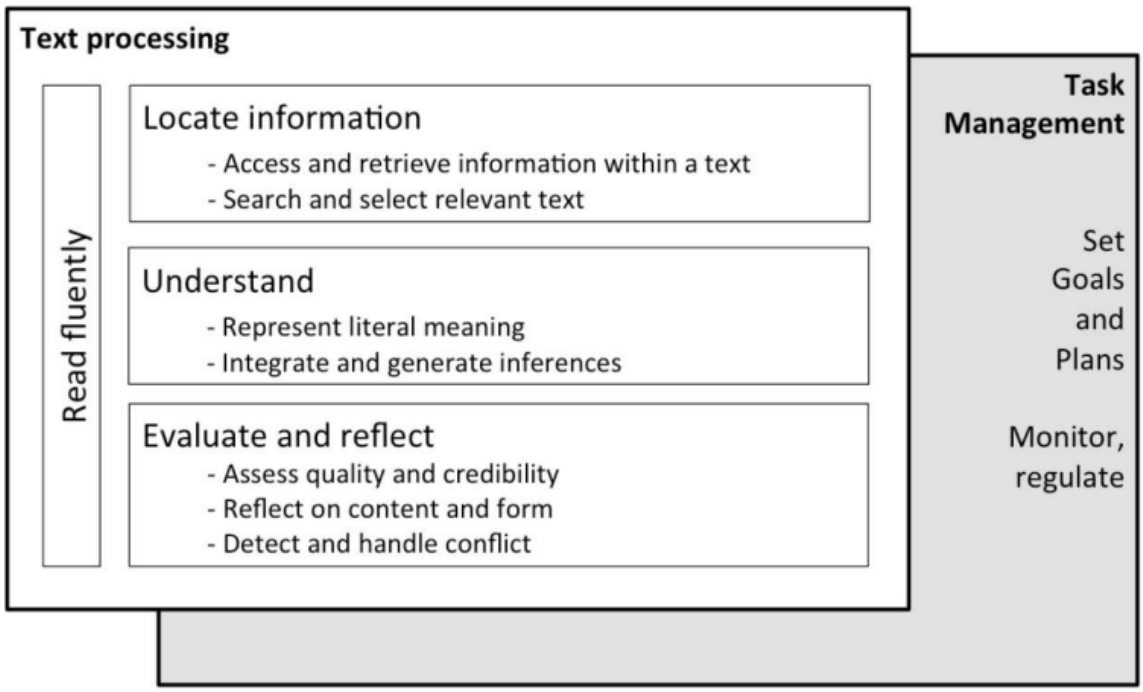
Reading framework processes

The cognitive evaluation in PISA assesses reading literacy by manipulating task and text factors, supplemented by a questionnaire examining reader factors like motivation, disposition, and experience. Two fundamental considerations inspire the design of the PISA reading literacy assessment. First, it aims to cover an extensive array of reading materials and purposes encountered by students both within and beyond the school environment. Second, it strives to represent a natural spectrum of difficulty in texts and tasks. The structure of the PISA reading literacy assessment revolves around three key characteristics: text (the variety of materials being read), processes (the cognitive approaches readers employ when engaging with a text), and scenarios (the diverse contexts or purposes for reading). Tasks within these scenarios delineate the specified goals that readers must attain for success. These three elements synergize to ensure comprehensive coverage of the reading domain (OECD, 2019).

In PISA, task difficulty can be adjusted by manipulating text features and task goals, requiring the utilization of different cognitive processes. Hence, the primary objective of the PISA

reading literacy assessment is to grasp students' proficiency in reading processes, encompassing the various cognitive approaches employed when interacting with a text. This is achieved by varying the dimensions of text (the range of materials being read) and scenarios (the diverse contexts or purposes for reading), using one or more thematically related texts. While individual differences in reader factors are acknowledged based on each reader's skills and background, these factors are not manipulated in the cognitive instrument itself. Instead, they are captured through the questionnaire component of the assessment. Figure 2.1 illustrates the processes involved in defining reading and reading literacy.

Figure 2.1. Reading processes in the PISA 2018 framework



Source: OECD (2019), Figure 2.2

4. Read fluently: This process denotes the student's ability to read words and texts fluently, comprehending their meaning automatically. It serves as an indicator of the ease and efficiency with which written texts are understood. Additionally, fluent readers can memorize more material due to the reduced cognitive effort required for text comprehension, thereby facilitating more effective comprehension and learning (OECD, 2019).

5. Locate information: This process involves the skill readers need to comprehend the messages and ideas conveyed by written text, especially crucial when dealing with digital or online content. The 2018 reading framework defines two processes enabling readers to locate information: accessing and retrieving information within a piece of text and searching for and selecting relevant text.
6. Understand: Given that many reading activities involve comprehending information and knowledge within the text, this process involves constructing a mental image or representation of the text's content. This is achieved through two parallel processes: acquiring a representation of the literal meaning of a text and constructing an integrated text by generating various types of inferences.
7. Evaluate and reflect: Beyond understanding the text itself, readers must go beyond the initial literal message. This occurs through subprocesses within the skill of evaluating and reflecting, including assessing the quality and credibility of the text, reflecting on its content and form, and detecting and handling conflicts arising from different parts of the text.
    1. Task management processes: These processes pertain to readers' engagement with texts, driven by various requirements. The readers' interpretation of task requirements significantly influences task management processes. However, the construction of reading goals extends beyond explicit instructions, as readers may formulate their own goals based on personal interests and initiative. It is important to note that, in the PISA reading literacy assessment, only the goals formed by readers in response to external prompts for a given task are considered. Additionally, due to implementation constraints, task management processes are represented, but not directly and independently assessed as part of the PISA 2018 evaluation.

Assessing reading literacy

Engaging in purposeful reading involves specific goals. Traditional assessments often expose test-takers to an array of disconnected passages spanning various subjects. This is followed by a set of distinct questions. PISA 2018, however, opted for a distinct strategy. It introduced scenarios where students were assigned an overarching purpose for engaging with related texts. These scenarios aimed for more complex tasks, such as responding to integrative

questions or formulating recommendations based on the provided texts. Alongside these scenario-based tasks, the assessment also included standalone reading units.

The introduction of scenarios and reading purposes established a framework for students to navigate the texts based on specific criteria. These criteria included searching for precise information, evaluating sources, comprehending texts, and integrating information. The range of sources covered diverse materials, including literature, textbooks, emails, blogs, websites, policy documents, and historical texts. While the prompts did not grant complete autonomy, students were allowed to select the textual sources and pathways to respond to the prompts, offering flexibility in evaluating goal-driven reading within the confines of a large-scale assessment.

Each scenario in the PISA 2018 reading literacy assessment consisted of one or more tasks, involving a variety of questions related to the texts within the scenario. These questions spanned from traditional comprehension items, such as locating information or making inferences, to more intricate tasks like synthesizing and integrating multiple texts, evaluating web search results, or corroborating information across different sources.

Tasks within a scenario were typically sequenced in terms of difficulty, as shown in Figure 2.2. For instance, a student might encounter an initial task involving the location of a specific document based on a search result. The subsequent task might entail answering a question about information explicitly stated in the text. Finally, in a third task, the student might be required to compare the author's point of view in the first text with that in a second text. These tasks could be scaffolded, meaning that if a student struggled to find the correct document in the first task, they would be provided with the correct document to complete the subsequent tasks. This approach ensured that multipart scenarios did not become an activity with just a binary outcome, but allowed for the nuanced evaluation of different student skills through a realistic set of tasks. Thus, the scenarios and tasks in the PISA 2018 reading literacy assessment were designed to align with the units and items utilized in prior assessments, offering a comprehensive and structured approach to evaluating students' reading abilities across varying levels of complexity.

Figure 2.2. Approximate distribution of tasks in the 2018 reading framework

2015 FRAMEWORK	2018 FRAMEWORK		
	SINGLE Text		MULTIPLE Text
Accessing and retrieving 25%	Scanning and locating 15%		Searching for and selecting relevant text 10%
Integrating and interpreting 50%	Literal Comprehension 15% Inferential Comprehension 15%		Multiple-text Inferential Comprehension 15%
Reflecting and evaluating 25%	Assessing quality and credibility Reflecting on content and form	20 %	Corroborating/handling conflict 10%

Source: OECD (2019), Table 2.2

Reading items

The primary goal of the PISA reading literacy assessment is to track and communicate the reading proficiency of 15-year-olds as they approach the conclusion of compulsory education. Each task in the assessment is designed to replicate a reading activity that students might encounter within and beyond school settings, reflecting the diverse reading behaviors of adolescents and adults. These tasks encompass a spectrum, ranging from straightforward activities focused on locating and comprehending information to more complex endeavors that demand the integration of information from multiple texts. Scenarios are carefully crafted to emulate varied reading situations, where the term "situation" denotes the context and purpose for which the reader engages with the text. Texts are cross classified into different situations, covering a range of genres and purposes, with the aim of maximizing the content diversity represented in the PISA reading literacy test.

To ensure a comprehensive representation of different reading types in the assessment, text types are categorized based on the intent and internal organization of the text. Although real-world texts often resist strict categorization due to their multifaceted nature, categorizing texts based on their predominant characteristics is a valuable strategy. The response format employed to collect evidence of student ability is diverse, considering the type of evidence collected and the practical constraints of a large-scale assessment. Interactive response formats, such as highlighting and dragging-and-dropping, are available in computer-based assessments, in addition to multiple-choice and short constructed-response items, similar to those in paper-based assessments. Emphasizing the quality of students' thinking over their final response, open constructed-response items are particularly crucial for assessing reflective and evaluative

processes. However, it is important to note that the assessment predominantly focuses on reading skills and does not assess writing skills like spelling and grammar.

A notable addition to the PISA 2018 reading literacy assessment is the evaluation of reading fluency, measuring students' ability to read simple texts with ease and efficiency. This serves as an indicator of variations between students, particularly those with lower reading proficiency levels. Assessing reading fluency aids in understanding the challenges faced by students who may struggle with foundational reading skills. These students may allocate more cognitive effort to lower-level skills, potentially leaving fewer resources for higher-level comprehension tasks. To gain a nuanced understanding of the difficulties encountered by students with lower proficiency, a specific task measuring reading ease and efficiency can be administered at the outset of the assessment. The performance on this task can be scaled and reported independently from the main proficiency scale, providing valuable insights to differentiate students with foundational skill deficits from those who read proficiently but at a slower pace.

PISA reading proficiency levels

The formulation of the PISA reading tasks involved collaboration among an international consortium of educational research institutions engaged by participating countries through the OECD. Guided by a group of reading experts from participating nations, the process included contributions of material and questions from these countries. These inputs underwent iterative review, testing, and refinement over a three-year period leading up to the assessment administration in 2018. Multiple rounds of commentary from participating countries, along with small-scale piloting and a formal field trial involving samples of 15-year-olds from all participating nations, were integral to the development process. The final selection of tasks was recommended by the reading expert group, considering their technical quality based on performance in the field trial, cultural appropriateness, and interest level for 15-year-olds as evaluated by participating countries (OECD, 2019). The task selection aimed to maintain balance across various categories of text, aspect, and situation, aligning with the earlier-described framework. Moreover, the set of questions encompassed a range of difficulty levels to ensure a comprehensive measurement

and description of the reading literacy of all 15-year-old students, from the least proficient to the highly able.

PISA generates an overarching reading literacy scale based on all questions in the reading assessment, along with scales for three aspects and two text formats. The metric for the overall reading scale is anchored on a mean score of 500 for OECD countries in PISA 2000, with a standard deviation of 100. To make the interpretation of scores easier, the scale is segmented into levels using statistical principles. Descriptions are crafted based on the tasks within each level, providing insights into the skills and knowledge required for successful completion. The reading proficiency levels span from the lowest described level (level 1c) through level 1a, level 2, level 3, and so forth, up to level 6 (Table A1 in Appendix A).

Proficiency level 6: Students who attain a proficiency level of 6 on the PISA reading scale are acknowledged as adept readers. They exhibit advanced skills in dissecting texts, highlighting a thorough grasp of both overt information and suggested meanings. These individuals possess the capability to thoughtfully assess and judge what they read on a broader scale. Having effectively completed nearly all tasks within the reading assessment, these students display their adeptness in navigating a diverse array of reading materials. They prove to be adaptable readers, comprehending information from unfamiliar subject areas presented in unconventional formats, as well as engaging with familiar content marked by typical structures and text features. Moreover, those identified as highly skilled readers according to PISA criteria demonstrate the aptitude to set aside preconceived notions when faced with new information, even if it challenges their initial expectations. They can recognize and interpret information provided in a text, both overtly and subtly, all while applying a discerning perspective. They leverage sophisticated insights that extend beyond the text itself. This blend of assimilating new information and critically evaluating it holds significant value in knowledge-based economies, where innovation and nuanced decision-making based on evidence are paramount.

Proficiency level 5: Students achieving a proficiency level of 5 on the PISA reading literacy scale showcase adeptness in navigating unfamiliar texts, encompassing both form and content. They excel in extracting information from these texts, demonstrating a comprehensive understanding

of the material and making inferences to discern the relevance of information to the given task. Moreover, individuals at this proficiency level exhibit the capacity to critically assess texts, formulate hypotheses, draw on specialized knowledge, and remain receptive to ideas that may challenge their initial expectations. The tasks assigned to level 5 students suggest their potential to evolve into outstanding knowledge workers in the future, equipped with the skills required for high-level positions across diverse fields. These students embody critical thinking, analytical prowess, and adaptability essential for success in intricate and evolving professional landscapes. Consequently, the percentage of students reaching level 5 on the reading literacy scale holds significance for a country's future economic competitiveness, reflecting the potential reservoir of highly skilled individuals poised to contribute to the nation's knowledge-based economy and global standing.

Proficiency level 4: Individuals attaining level 4 on the PISA reading literacy scale showcase proficiency in tackling demanding reading assignments. These assignments encompass tasks such as identifying embedded information within a text, discerning subtle language nuances, and critically evaluating content. Level 4 tasks often necessitate students to extract specific information by identifying and organizing multiple pieces of embedded information within a text. Students are also required to interpret the meaning of language nuances, considering the text holistically. Additionally, interpretative tasks at this level involve understanding and applying categories in an unfamiliar context, highlighting the ability to apply prior knowledge to novel situations. Reflective tasks at this proficiency level call for readers to leverage formal or public knowledge to hypothesize about or critically evaluate a text. Successful completion of these tasks requires students to demonstrate a precise understanding of lengthy or intricate texts that may be unfamiliar in terms of content or form. In summary, individuals at level 4 exhibit robust reading skills, effectively engaging with challenging texts. They can comprehend and analyze complex information, draw inferences, and approach the presented content with critical thinking.

Proficiency level 3: Students proficient at level 3 on the reading literacy scale exhibit competence in managing reading tasks of moderate complexity. These tasks encompass a range of skills, including locating multiple pieces of information, establishing connections between different

sections of a text, and relating the text to familiar everyday knowledge. At level 3, tasks necessitate students to identify and, in some instances, discern the relationship between several pieces of information that must meet multiple conditions. This implies the need to grasp information that may not be explicitly stated or may be presented in a less conspicuous manner. In interpretative tasks, students integrate various parts of a text to identify the main idea, understand relationships, or interpret the meaning of specific words or phrases. They also need to consider multiple features when comparing, contrasting, or categorizing information. The text may present challenges, such as ideas that deviate from expectations or statements framed in a negative manner. Reflective tasks at level 3 may involve establishing connections, making comparisons, and providing explanations within the text. Students might be tasked with evaluating a specific feature of the text or demonstrating a nuanced understanding of the text in relation to their familiar everyday knowledge. Some reflective tasks may require students to draw on less common knowledge from outside the text, displaying their ability to apply broader knowledge to the reading material. Overall, students at level 3 possess solid reading skills and can effectively engage with moderately complex texts. They can locate and synthesize information, make inferences, and demonstrate a reasonable understanding of the content. While they may encounter some challenges in the text, they exhibit the ability to navigate them and display a satisfactory level of comprehension.

Proficiency level 2: Individuals proficient at level 2 on the reading literacy scale exhibit fundamental competence in a variety of reading tasks. These tasks encompass locating information that meets multiple conditions, making straightforward comparisons or contrasts based on a single feature, comprehending the meaning of a well-defined part of a text even when it is not prominently presented, and establishing connections between the text and personal experiences. At this proficiency level, students can locate specific pieces of information in a text, involving inference and meeting multiple conditions. They can discern the main idea of a text, grasp relationships within the text, and interpret the meaning of a limited part of the text through basic inferences. Tasks may include comparisons or contrasts based on a single feature or aspect mentioned in the text. Reflective tasks at level 2 typically prompt students to make comparisons or connections between the text and their external knowledge. They may draw on personal

experiences and attitudes to relate to the content of the text. Individuals at this proficiency level can make elementary connections between the text and their own background knowledge, utilizing personal experiences to enhance their understanding. Overall, those at level 2 demonstrate foundational reading skills. They can locate information, understand basic relationships within a text, and make simple inferences. While their comprehension may be confined to specific parts of the text, they are capable of drawing on personal experiences to connect with the content. Although students at level 2 may still have limitations in their reading abilities, achieving this level signifies a crucial milestone in their reading development, indicating the acquisition of fundamental skills necessary for comprehending written texts and engaging in activities that demand reading comprehension.

Proficiency level 1a: Individuals proficient at level 1a on the reading literacy scale highlight fundamental reading competencies that enable them to interact with uncomplicated texts and extract explicitly stated information. While their reading skills are still evolving, they possess foundational abilities that empower them to understand texts on familiar topics and establish connections with their everyday experiences. At this proficiency level, students can locate pieces of information that are explicitly stated and relatively prominent within the text. They can identify the main idea or theme of a text, particularly when the topic is familiar to them. Additionally, they can recognize the connection between the information presented in the text and their existing knowledge from everyday life. Tasks at level 1a typically involve straightforward comprehension of texts with clear and explicit information. The required information is typically easy to find within the text, and there is minimal or no conflicting information. Students are explicitly guided to consider relevant factors and are provided with clear instructions in the task and text. Although students at level 1a may exhibit limited reading abilities compared to higher proficiency levels, attaining this level signifies a crucial step in their reading development. It indicates that they have acquired basic skills to comprehend simple texts, extract explicit information, and establish connections between the text and their everyday experiences. Overall, those at level 1a demonstrate initial reading competencies that establish the foundation for further reading development, marking the commencement of their journey toward becoming

proficient readers capable of engaging with a broader range of texts and extracting deeper meaning.

Proficiency level 1b: Individuals proficient at level 1b on the reading literacy scale exhibit foundational reading skills that enable them to interact with brief and straightforward texts. While their reading abilities are in the early stages of development, they possess basic competencies that facilitate the identification of explicitly stated information and the making of low-level inferences. At this proficiency level, students can locate a single piece of explicitly stated information in a concise and uncomplicated text. The texts they encounter typically have a familiar style, content, and context, such as narratives or simple lists. The required information is usually presented prominently within the text, making it accessible for students to identify. Tasks at level 1b involve texts that offer support to the reader, such as the repetition of information, inclusion of pictures, or use of familiar symbols. The text structure is straightforward, and there is minimal competing information or complex sentence structures. Students can rely on the text's features to aid them in understanding and locating the required information. Additionally, students at this level can make low-level inferences, such as recognizing a causal connection across two sentences even when it is not explicitly stated. While their inferencing skills are still developing, they can establish basic connections between adjacent pieces of information within the text. Level 1b tasks concentrate on basic comprehension, requiring students to engage with texts that provide ample support and familiar content. Students are guided by the structure and context of the text to locate information and make simple connections. The emphasis lies on foundational reading skills, including identifying explicitly stated information and making basic inferences.

Proficiency level 1c: Achieving level 1c proficiency on the PISA scale signifies the lowest tier of reading skills and competencies. Individuals at this level can comprehend and affirm the fundamental meaning of short and straightforward sentences at a literal level. They can read with a clear and specific purpose within a constrained time limit. Tasks at this proficiency level involve vocabulary and sentence structures that are uncomplicated and familiar. Students at Level 1c possess a rudimentary understanding of reading but encounter challenges with more intricate texts and higher-order comprehension skills. Their reading abilities are constrained, and they may

necessitate supplementary support to effectively comprehend and interpret more demanding reading materials.

MATHEMATICS ASSESSMENT FRAMEWORK 2022

The PISA definition of mathematical literacy

The fundamental aim of the PISA assessment revolves around evaluating an individual's capability to apply, utilize, and comprehend mathematics in diverse scenarios. This involves logical reasoning within mathematical frameworks and using mathematical principles, methods, information, and tools to depict, elucidate, and anticipate phenomena. It fosters an understanding of the significance of mathematics in society, enabling individuals to make informed and rational judgments as responsible, engaged, and thoughtful community members.

Therefore, it is crucial to assess the preparedness of young individuals after completing their schooling, particularly their ability to employ mathematics in contemplating personal lives, strategizing for the future, and addressing significant problems in various aspects of existence. Conducting an assessment at the age of 15 provides countries with preliminary insights into how individuals might approach the diverse situations they will face later in life, requiring the application of mathematical reasoning, including deductive and inductive reasoning, and problem-solving skills to derive meaning and find effective solutions.

As per the mathematics assessment framework from the PISA 2022 assessment, mathematical literacy is defined as an individual's capacity to reason mathematically and apply mathematics to solve problems in real-world contexts. It encompasses concepts, procedures, facts, and tools to describe, explain, and predict phenomena, assisting individuals in understanding the role of mathematics in the world and making well-founded judgments and decisions needed by constructive, engaged, and reflective 21st-century citizens.

Comparing the PISA 2022 framework to its predecessors, such as the PISA 2003 and PISA 2012 frameworks, certain fundamental principles of mathematical literacy are acknowledged and retained. However, the PISA 2022 framework recognizes shifts in the students' world, necessitating a corresponding change in the assessment approach for mathematical literacy. This shift is prompted by the constant technological advancements and evolving trends in the contemporary landscape. Citizens are increasingly expected to be creative, proactive, and capable of making independent judgments that positively impact both themselves and society at

large. Consequently, the emphasis is moving from the mere mastery of basic calculations to a broader focus on equipping students with the skills and mindset required to navigate this dynamic and rapidly changing world.

Content knowledge and context categories

The primary goal of the PISA assessment is to evaluate individuals' mathematical abilities, emphasizing their capacity to reason, solve problems, and interpret situations across diverse contexts. This includes applying logical reasoning within mathematical frameworks and utilizing mathematical principles, methods, information, and tools for depicting, elucidating, and anticipating phenomena. Such proficiency is crucial for individuals to comprehend the societal significance of mathematics, enabling them to make informed, rational decisions as responsible and engaged community members.

The assessment's significance lies in gauging the readiness of young individuals upon completing their schooling, especially regarding their ability to employ mathematics in personal reflection, future planning, and addressing significant issues in various facets of life. An assessment at age 15 provides countries with initial insights into how individuals might approach diverse situations later in life, requiring mathematical reasoning, deductive and inductive, and problem-solving skills for effective solutions.

According to the mathematics assessment framework in PISA 2022, mathematical literacy is defined as an individual's capacity to reason mathematically and apply mathematics to solve problems in real-world contexts. This includes using concepts, procedures, facts, and tools to describe, explain, and predict phenomena, fostering understanding of mathematics in the world. The framework retains fundamental principles from earlier versions but acknowledges shifts in the students' world, necessitating an adjusted approach to mathematical literacy assessment. Given the constant technological advancements and evolving trends, the focus is shifting from basic calculations mastery to equipping students with skills and a mindset adaptable to the dynamic, rapidly changing contemporary world.

Content knowledge, a key aspect, refers to the mathematical understanding necessary for reasoning, problem-solving, and interpreting situations across contexts. The PISA 2022 framework retains content categories like change and relationship, space and shape, quantity, and uncertainty and data. Four topics, growth phenomena, geometric approximation, computer simulations, and conditional decision-making, receive special emphasis due to their relevance in contemporary mathematical literacy.

Change and relationship involve understanding various types of change, crucial for describing and predicting phenomena, especially in contexts like pandemics or climate change. Space and shape encompass patterns, positions, orientations, and visual information, emphasizing geometry and geometric approximation for meaningful measurements and dealing with non-standard patterns. Quantity, a fundamental concept, deals with quantification, interpretation, and representation, often involving computer simulations for complex problem-solving. Uncertainty and data knowledge focus on recognizing variations, uncertainty, errors, and conditional decision-making, vital for analyzing real-world problems with inherent uncertainty.

In the PISA 2022 mathematics framework, four context categories, personal, occupational, societal, and scientific, inform the development of assessment items. These contexts, while not intended for reporting, provide a foundation for constructing items that evaluate students' mathematical abilities across various domains and difficulty levels. 21st-century skills, although not specifically used in item development, have been considered in the process. These skills, including critical thinking, creativity, research and inquiry, self-direction, initiative, and persistence, information use, systems thinking, communication, and reflection, play a role in shaping educational curricula for the future.

Paper-based and computer-based assessment and response types

Since the initiation of the 2015 cycle, computer-based assessment (CBA) has become the primary testing method, complemented by a paper-based alternative for countries opting out of computer-based testing. Notably, the full potential of computer-based assessments was not fully harnessed in the 2015 and 2018 mathematical literacy assessments. In PISA 2022, a significant shift is evident as computer-based assessment of mathematics (CBAM) takes precedence as the primary delivery mode for evaluating mathematical literacy. To accommodate diverse preferences and circumstances, countries choosing against computer-based testing can still opt for paper-based assessment instruments, ensuring inclusivity in the assessment process.

Responding to the changing landscape of assessment practices, the framework itself has been updated to reflect the shift introduced in 2015. This revision includes a detailed discussion outlining essential considerations for developing CBAM items, marking the first major update to the mathematics framework since the integration of computer-based assessment in the PISA program. This underscores PISA's commitment to embracing technological advancements while providing flexibility to cater to diverse testing preferences globally. By aligning the framework with this new delivery mode, PISA aims to ensure that the assessment process remains relevant, robust, and aligned with the dynamic educational landscape.

Regarding the types of responses expected, PISA incorporates a distinction between selected response items and constructed response items. Selected response items include simple and complex multiple-choice questions, with the latter requiring students to select correct answers for interconnected items. Computer-based assessments introduce further response variations, such as selecting options from a drop-down box or using interactive features.

Constructed response items require students to generate their own responses, which can be scored routinely for single numerical values or concise phrases. In computer-based assessments, these responses can be automatically processed, streamlining the scoring process. However, some constructed response items, involving explanations or lengthy calculations, may necessitate expert scoring, requiring evaluators with subject-matter expertise. This diversified

approach, encompassing both selected and constructed response items, ensures a comprehensive evaluation of students' skills and competencies, capturing their ability to select correct answers and generate thoughtful, well-reasoned responses that may require expert evaluation.

How the PISA mathematics results are classified

The development, analysis, and scaling of the PISA 2012 mathematics tests underwent a thorough process to ensure alignment with the PISA 2022 framework. The items were required to cover content, processes, and contexts suitable for 15-year-olds and be of interest to students across participating countries. The diverse material, contributed by authors from nearly 30 countries, aimed for a comprehensive representation of content and approaches relevant to PISA-participating nations.

To meet stringent standards, the items underwent rigorous evaluation for technical quality and international comparability. Experts reviewed and tested items among 15-year-old students through field trials, gathering feedback on curricular relevance and appropriateness. The comprehensive review process, involving an international expert group and the PISA Governing Board, ensured a balanced representation across the mathematics framework categories and a range of difficulty levels (OECD, 2023c).

The structured approach to item development involved organizing items into "units" comprising stimulus material and related questions. Constructed-response items required students to engage in analysis, calculations, and mathematical reasoning, offering insights into their methods and thought processes. Some open-ended items necessitated manual coding for response categorization, ensuring consistent results across countries.

The test design facilitated a single proficiency scale for mathematics, associating each question with a specific difficulty level on the scale. The placement of students on the scale reflected their estimated mathematical proficiency, considering the proportion of correct answers to determine both task and individual proficiency levels. This continuous scale allowed

for a clear representation of the relationship between question difficulty and test-taker proficiency, ensuring an accurate measure of mathematical literacy.

PISA mathematics proficiency levels

In order to offer a comprehensive evaluation of mathematical proficiency, PISA utilizes various scales, including an overall mathematics scale, scales for mathematical processes, and scales for specific mathematical content categories. The overall mathematics scale is based on a mean of 500 points and a standard deviation of 100 points for OECD countries, established in PISA 2003. Common items between the 2003 and 2022 test instruments allow for continuity and comparison.

The mathematics scale is divided into six proficiency levels for PISA 2022, aligning with those used in describing the outcomes of PISA 2003 (Table A2 in Appendix A). Each level represents a range of task difficulties, with Level 1 being the lowest and Level 6 the highest. These levels characterize cognitive demands, reflecting the knowledge and skills needed to complete tasks successfully. The descriptions of each level have been updated to reflect the new mathematical process categories introduced in the PISA 2022 framework. It is essential to note that students below Level 2 may face challenges in their educational and professional endeavors, emphasizing the need for targeted interventions and support to ensure the acquisition of minimum mathematical competencies. Efforts to support students below Level 1 should prioritize building a solid foundation of mathematical understanding and skills to equip them for higher-level challenges.

***Proficiency level 6*:** Level 6 represents the pinnacle of mathematical proficiency. Students at this level showcase exceptional abilities in tackling the most challenging PISA items. They demonstrate a high level of conceptual understanding, versatility, and adaptability. Critical thinking, advanced reasoning, and metacognitive abilities are hallmarks of Level 6 students.

Proficiency level 5: Level 5 signifies a high level of mathematical proficiency. Students demonstrate the capacity to engage with complex situations and employ modeling techniques.

They exhibit a strategic approach to problem-solving, drawing upon a broad range of well-developed thinking and reasoning skills.

Proficiency level 4: Level 4 indicates a solid level of mathematical proficiency. Students at this level can work effectively with explicit models in complex and tangible situations. They can select and integrate various representations, including symbolic ones, to model and analyze mathematical problems.

Proficiency level 3: At Level 3, students demonstrate a foundational level of mathematical proficiency. They can execute clearly described procedures, interpret mathematical information, and reason directly from various representations. Competence in handling percentages, fractions, decimal numbers, and proportional relationships is characteristic of Level 3 students.

Proficiency level 2: Level 2 represents a basic level of mathematical proficiency. Students can interpret and recognize situations within specific contexts, apply basic algorithms or procedures, and solve problems primarily involving whole numbers.

Proficiency level 1a: Students at Proficiency Level 1a in the PISA mathematics framework possess a basic understanding of mathematical concepts, enabling them to engage with elementary mathematical situations. Their mathematical knowledge is limited, allowing them to provide simple explanations and descriptions related to basic mathematical phenomena. While their understanding is in its nascent stages, Level 1a students take initial steps toward building mathematical literacy. They can recognize and understand rudimentary mathematical information within a given context, demonstrating an awareness of foundational mathematical principles that form the groundwork for more advanced learning.

Proficiency level 1b: At this proficiency level, Level 1b, students in the PISA mathematics framework exhibit a minimal understanding of mathematical concepts. They can recognize and identify basic mathematical information but possess a limited ability to engage with more complex mathematical content. Level 1b proficiency reflects a preliminary stage of mathematical literacy, where students are in the early phases of developing foundational knowledge in mathematics. Although their understanding may be at an elementary level, Level 1b students are

taking initial strides toward building mathematical literacy and developing the fundamental skills necessary for future mathematical learning and application.

Proficiency level 1c: Students at Proficiency Level 1c in the PISA mathematics framework respond to mathematical questions involving easy-to-understand contexts, where all relevant information is clearly given in a simple, familiar format and defined in short, syntactically simple text. Their mathematical competence allows them to follow clear instructions describing a single step or operation. While their abilities are limited to straightforward mathematical tasks, Level 1c students demonstrate basic proficiency in applying mathematical procedures and conventions. They can respond to questions within the confines of easily comprehensible mathematical scenarios, displaying the foundational skills necessary for basic mathematical problem-solving.

SCIENCE ASSESSMENT FRAMEWORK 2015

The PISA definition of scientific literacy

Scientific literacy within the context of PISA encompasses both science and science-based technology, requiring an understanding of concepts, theories, and the practices of scientific inquiry. Scientifically literate individuals grasp the foundational ideas shaping scientific and technological thinking, the derivation of knowledge, and the level of support from evidence or theoretical explanations.

To engage in critical discussions on science and technology, three science-specific competencies are essential. The ability to provide explanatory accounts, utilize scientific inquiry to identify research questions, and interpret and assess scientific data and evidence are vital. These competencies extend beyond content knowledge, requiring procedural knowledge of scientific procedures and practices, and epistemic knowledge encompassing the rationale behind inquiry practices and the status of scientific claims (OECD, 2017).

Explaining phenomena scientifically: advancements in science have revolutionized our understanding of the natural world, leading to life-supporting technologies. Explaining scientific phenomena demands not only recalling theories and facts but also understanding the derivation and confidence level of scientific claims. This requires familiarity with procedural knowledge, the

customary forms and procedures in scientific inquiry, and awareness of one's role in justifying scientific knowledge (epistemic knowledge).

Evaluating and designing scientific inquiry: scientific literacy involves understanding the purpose of scientific inquiry, data gathering, and hypothesis formulation. This competency relies on content knowledge, procedural knowledge of scientific procedures, and epistemic knowledge of their function in justifying claims. It enables individuals to evaluate scientific investigations, ensuring appropriate procedures are followed and conclusions are warranted. Additionally, it empowers proposing how a scientific question could be appropriately investigated.

Interpreting data and evidence scientifically: interpreting data is fundamental for scientists. Scientifically literate individuals identify patterns, analyze relationships within data, and understand the inherent uncertainty in measurements. This process requires procedural knowledge of standard patterns and assessing the appropriateness of procedures and resulting claims (epistemic knowledge). A critical mindset toward empirical evidence, defending interpretations, and advocating for validity requires a combination of content knowledge and procedural and epistemic knowledge.

Organization of the domain and scientific knowledge

In the PISA 2018 evaluation of scientific knowledge, a diverse array of contexts is employed, addressing pertinent issues found in science education curricula across participating countries. Beyond the confines of traditional school science, PISA 2018 explores contexts tied to personal experiences, family, peer groups, local and national communities, or global perspectives. These contexts encompass technology, and historical elements may be integrated to assess students' comprehension of the processes and practices underpinning scientific knowledge advancement (Figure 2.3). The items in the PISA science assessment are categorized into five applications of science and technology: health and disease, natural resources, environmental quality, hazards, and the frontiers of science and technology. It is crucial to emphasize that the assessment does not solely center on these contexts but rather evaluates competencies and knowledge within specific scenarios. The chosen contexts are selected based

on their relevance to students' interests and daily lives, as well as their significance in improving and sustaining the quality of life and influencing the development of public policies.

Figure 2.3. Contexts for PISA scientific assessment

	Personal	Local/National	Global
Health and disease	Maintenance of health, accidents, nutrition	Control of disease, food choices, community health	Epidemics, spread of infectious diseases
Natural resources	Personal consumption of materials and energy	Maintenance of human populations, quality of life, security, production and distribution of food, energy supply	Renewable and non-renewable natural systems, population growth, sustainable use of species
Environmental quality	Environmentally friendly actions, use and disposal of materials and devices	Population distribution, disposal of waste, environmental impact	Biodiversity, ecological sustainability, control of pollution, production and loss of soil/biomass
Hazards	Risk assessments of lifestyle choices	Rapid changes (e.g., earthquakes, severe weather), slow and progressive changes (e.g., coastal erosion, sedimentation), risk assessment	Climate change, impact of modern communication
Frontiers of science and technology	Scientific aspects of hobbies, personal technology, music and sporting activities	New materials, devices and processes, genetic modifications, health technology, transport	Extinction of species, exploration of space, origin and structure of the Universe

Source: OECD (2017), Figure 2.3

To demonstrate proficiency in explaining phenomena scientifically, students must not only recall relevant content knowledge in a given situation but also apply it to interpret and provide explanations for the observed phenomena. This competency involves generating explanatory hypotheses based on observations or presented data, using standard scientific models to construct simple representations of everyday phenomena, and utilizing these representations to make predictions. It encompasses the ability to describe or interpret phenomena, predict potential changes, and recognize appropriate descriptions, explanations, and predictions.

The competency of evaluating and designing scientific inquiries is crucial for critically assessing reports of scientific findings and investigations. It requires the ability to differentiate scientific questions from other types of inquiries, identify questions suitable for scientific investigation, and understand key elements of a scientific investigation, such as what should be measured, which variables to manipulate or control, and measures to ensure accurate data collection. This competency also involves evaluating the quality of data, recognizing potential

inaccuracies, and discerning whether an investigation is driven by an underlying theoretical premise or aims to determine identifiable patterns. Students proficient in interpreting data and evidence scientifically can convey the meaning of scientific evidence to a specific audience, using appropriate diagrams or representations as needed. This competency includes utilizing mathematical tools to analyze or summarize data and employing standard methods to transform data into different representations.

Given the vast content domain of science, the PISA 2018 science assessment adopts clear criteria for selecting knowledge to be assessed (Figure 2.4). Content knowledge included in the assessment is chosen from key fields of physics, chemistry, biology, and earth and space sciences. The selection process adheres to principles of relevance to real-life situations, significance of scientific concepts and theories, and appropriateness for 15-year-olds. The assessed content knowledge is chosen based on its applicability to real-world contexts, representing important scientific concepts or major explanatory theories fundamental to understanding the natural world. The selection considers the developmental level of 15-year-olds, ensuring alignment with their cognitive abilities, prior learning, and educational context at this stage of their academic journey.

Figure 2.4. Content knowledge in the PISA science assessment

Physical systems, including:
Structure of matter (e.g., particle model, bonds)
Properties of matter (e.g., changes of state, thermal and electrical conductivity)
Chemical changes of matter (e.g., chemical reactions, energy transfer, acids/bases)
Motion and forces (e.g., velocity, friction) and action at a distance (e.g., magnetic, gravitational and electrostatic forces)
Energy and its transformation (e.g., conservation, dissipation, chemical reactions)
Interactions between energy and matter (e.g., light and radio waves, sound and seismic waves)
Living systems, including:
Cells (e.g., structures and function, DNA, differences between plant and animal cells)
The concept of an organism (e.g., unicellular vs. multicellular)
Humans (e.g., health; nutrition; subsystems such as the digestive, the respiratory, the circulatory, the excretory and the reproductive and their relationship)
Populations (e.g., species, evolution, biodiversity, genetic variation)
Ecosystems (e.g., food chains, matter and energy flow)
Biosphere (e.g., ecosystem services, sustainability)
Earth and space systems, including:
Structures of the Earth (e.g., lithosphere, atmosphere, hydrosphere)
Energy in the Earth (e.g., sources, global climate)
Change in the Earth (e.g., plate tectonics, geochemical cycles, constructive and destructive forces)
Earth's history (e.g., fossils, origin and evolution)
Earth in space (e.g., gravity, solar systems, galaxies)
The history and scale of the Universe and its history (e.g., light year, Big Bang theory)

Source: OECD (2017), Figure 2.5

The primary goal of science is to construct tentative explanatory accounts of the natural world, subjecting these explanations to empirical investigation. This empirical inquiry process relies on well-established concepts and methods that hold significant importance. Key elements include an understanding of dependent and independent variables, the control of variables, various measurement techniques, recognition of different forms of error, methods to minimize error, identification of common patterns in data, and approaches to presenting data. Possessing knowledge of these standard concepts and procedures is crucial for conducting scientific inquiries, laying the groundwork for the collection, analysis, and interpretation of scientific data. This body of knowledge is commonly referred to as procedural knowledge (Figure 2.5).

Figure 2.5. Procedural knowledge in the PISA science assessment

Procedural knowledge
The concept of variables, including dependent, independent and control variables;
Concepts of measurement, e.g. quantitative measurements, qualitative observations, the use of a scale or other instruments, categorical and continuous variables;
Ways of assessing and minimising uncertainty such as repeating and averaging measurements;
Mechanisms to ensure the replicability (closeness of agreement between repeated measurements of the same quantity) and accuracy (the closeness of agreement between a measured quantity and its true value) of measurements;
Common ways of abstracting and representing data using tables, graphs and charts and their appropriate use; The control of variables and its role in experimental design;
The use of randomised controlled trials to avoid confounded findings and to identify possible causal mechanisms; The nature of an appropriate design for a given scientific question, e.g., experimental, field-based or pattern-seeking.

Source: OECD (2017), Figure 2.6

Epistemic knowledge involves an understanding of the fundamental constructs and defining characteristics essential to the process of knowledge building in science. This encompasses knowledge of concepts such as hypotheses, theories, and observations. Students can leverage their epistemic knowledge to clarify the distinctions between a scientific theory and a hypothesis, as well as between a scientific fact and an observation, offering relevant examples. Moreover, epistemic knowledge entails recognizing that constructing models, whether representational, abstract, or mathematical, is a crucial aspect of scientific inquiry. These models are not meant to be exact replicas of the material world but function as maps that aid in understanding. It is crucial for students to comprehend that the term "theory" in science differs from its everyday language use, where it may be synonymous with a “guess”. In science, a theory signifies a well-substantiated explanation that has undergone extensive testing and is supported by a substantial body of evidence. While procedural knowledge is necessary to explain the concept of controlling variables, epistemic knowledge is required to articulate why employing the control of variables strategy is central to establishing scientific knowledge. It involves understanding the rationale behind this strategy and how it contributes to the reliability and

validity of scientific investigations. Thus, epistemic knowledge provides insights into the underlying principles and justifications guiding scientific inquiry (Figure 2.6).

Figure 2.6. Epistemic knowledge in the PISA science assessment

Epistemic knowledge
The constructs and defining features of science, that is: • The nature of scientific observations, facts, hypotheses, models and theories; • The purpose and goals of science (to produce explanations of the natural world) as distinguished from technology (to produce an optimal solution to human need), what constitutes a scientific or technological question, and what constitutes appropriate data; • The values of science, such as a commitment to publication, objectivity and the elimination of bias; • The nature of reasoning used in science, such as deductive, inductive, inference to the best explanation (abductive), analogical and model-based; The role of these constructs and features in justifying the knowledge produced by science, that is: • How scientific claims are supported by data and reasoning in science; • The function of different forms of empirical enquiry in establishing knowledge, including both their goal (to test explanatory hypotheses or identify patterns) and their design (observation, controlled experiments, correlational studies); • How measurement error affects the degree of confidence in scientific knowledge; • The use and role of physical, system and abstract models and their limits; • The role of collaboration and critique and how peer review helps to establish confidence in scientific claims; • The role of scientific knowledge, along with other forms of knowledge, in identifying and addressing societal and technological issues.

Source: OECD (2017), Figure 2.7

Assessment and test items

The frameworks discussed earlier have been instrumental in categorizing knowledge and competencies within the PISA 2018 science framework. However, the development of test items based on a cognitive hierarchy posed several challenges. The primary challenge was the potential risk of exerting excessive effort to fit test items into specific cognitive frameworks, risking the creation of poorly constructed items that do not effectively assess the intended competencies. Striking a balance between adhering to cognitive frameworks and ensuring the quality and validity of test items was crucial. Another challenge involved aligning the intended cognitive demand of the test items with the actual cognitive demand. The operationalization of cognitive standards in test items needed to fully reflect their intended cognitive rigor to ensure effective assessment.

A third challenge was the absence of a well-defined and universally understood cognitive framework. The lack of such a framework could lead to a focus on item difficulty during item writing, limiting the range of cognitive processes and knowledge types being assessed. Overcoming these challenges required careful consideration and a comprehensive understanding of cognitive frameworks, ensuring that test items effectively captured the intended competencies and cognitive demands specified.

The difficulty of items assessing science achievement is influenced by various factors. The complexity and number of knowledge elements, familiarity, and prior knowledge of students, required cognitive operations, and dependence on models or abstract ideas all contribute to item difficulty. Considering these factors is crucial in designing and selecting appropriate items for assessing science achievement, ensuring that the items align with cognitive demands and cover the necessary knowledge range.

In the PISA 2018 science assessment, items are organized into units to present realistic and complex contexts while optimizing testing time. By using situations that allow multiple questions, students become more familiar with the material efficiently. However, maintaining the independence of items within a unit is essential to preserve the assessment's integrity. The assessment employs three classes of items: simple multiple-choice, complex multiple-choice, and constructed response. These formats enable a comprehensive evaluation of scientific competencies, encompassing both selected responses and written/drawn explanations. Additionally, interactive tasks capture certain responses, such as manipulating variables in simulated scientific inquiries. Designing and selecting items that consider these factors contribute to a thorough assessment of students' scientific competencies and knowledge.

PISA science proficiency levels

In the PISA science assessment, students receive scores categorized into seven proficiency levels, ranging from Level 1b (lowest) to Level 6 (highest). These levels describe the science competencies demonstrated by students across different score ranges (Table A3 in Appendix A).

The categorization into proficiency levels is based on the assessed competencies, with each level associated with a description of the expected knowledge, skills, and abilities.

Assigning students to proficiency levels is straightforward, based on the highest level for which they would be expected to answer the majority of assessment questions correctly. For instance, consistently answering at least 50% of questions correctly within Level 3 results in assignment to that level. Within each level, there is variability in specific score points, allowing for a nuanced categorization that considers students' performance on varying task difficulties.

***Proficiency level 6*:** At the pinnacle of proficiency, Level 6 students display an advanced understanding of scientific concepts, applying this knowledge adeptly in complex and abstract situations. They exhibit a profound grasp of scientific principles, analyzing and evaluating information across diverse sources. These students excel in critical and creative thinking within scientific contexts, representing the epitome of scientific literacy. Proficiency at Level 6 indicates the capacity to contribute actively to scientific advancements, engage in sophisticated reasoning, and address intricate scientific challenges, demonstrating skills essential for navigating scientific frontiers.

Proficiency level 5: Level 5 students display a robust understanding of scientific concepts, effectively applying their knowledge in real-world contexts. They demonstrate competence in analyzing and interpreting scientific data, engaging in logical reasoning, and critically evaluating information. Proficient communication of scientific ideas is a hallmark, displaying an ability to comprehend and assess complex information from multiple sources. Level 5 proficiency signifies a significant scientific literacy level, indicating students' capability to solve intricate problems, make informed decisions based on evidence, and succeed in higher education and science-related careers.

Proficiency level 4: At Level 4, students possess a solid understanding of fundamental scientific concepts, applying this knowledge in various situations. They excel in interpreting scientific information, identifying patterns, and making connections between ideas. Proficient in solving moderately complex scientific problems, they demonstrate a commendable grasp of scientific

principles, communicating effectively. Level 4 proficiency denotes a praiseworthy level of scientific literacy, reflecting students' ability to engage with scientific content and apply knowledge practically, preparing them for further studies and contributions to scientific advancements.

Proficiency level 3: Level 3 students exhibit a basic understanding of scientific concepts, applying this knowledge in straightforward situations. They navigate simple scientific phenomena, solve basic problems, and engage in foundational scientific reasoning. While understanding may be limited, Level 3 proficiency signifies satisfactory scientific literacy, enabling students to comprehend and apply concepts in everyday scenarios, participate in discussions, and continue learning in science.

Proficiency level 2: Level 2 represents a limited understanding of scientific concepts, allowing basic application within constraints. Students possess foundational knowledge to identify and describe scientific information, but their engagement with complex tasks may be restricted. Level 2 proficiency meets minimal requirements for success in life, providing essential scientific literacy skills for navigating everyday situations and making informed decisions in scientific matters.

Proficiency level 1a: At Level 1a, students have a basic understanding of scientific concepts, providing simple explanations and descriptions related to scientific phenomena. They recognize basic scientific information, initiating the development of foundational knowledge for rudimentary engagement with science.

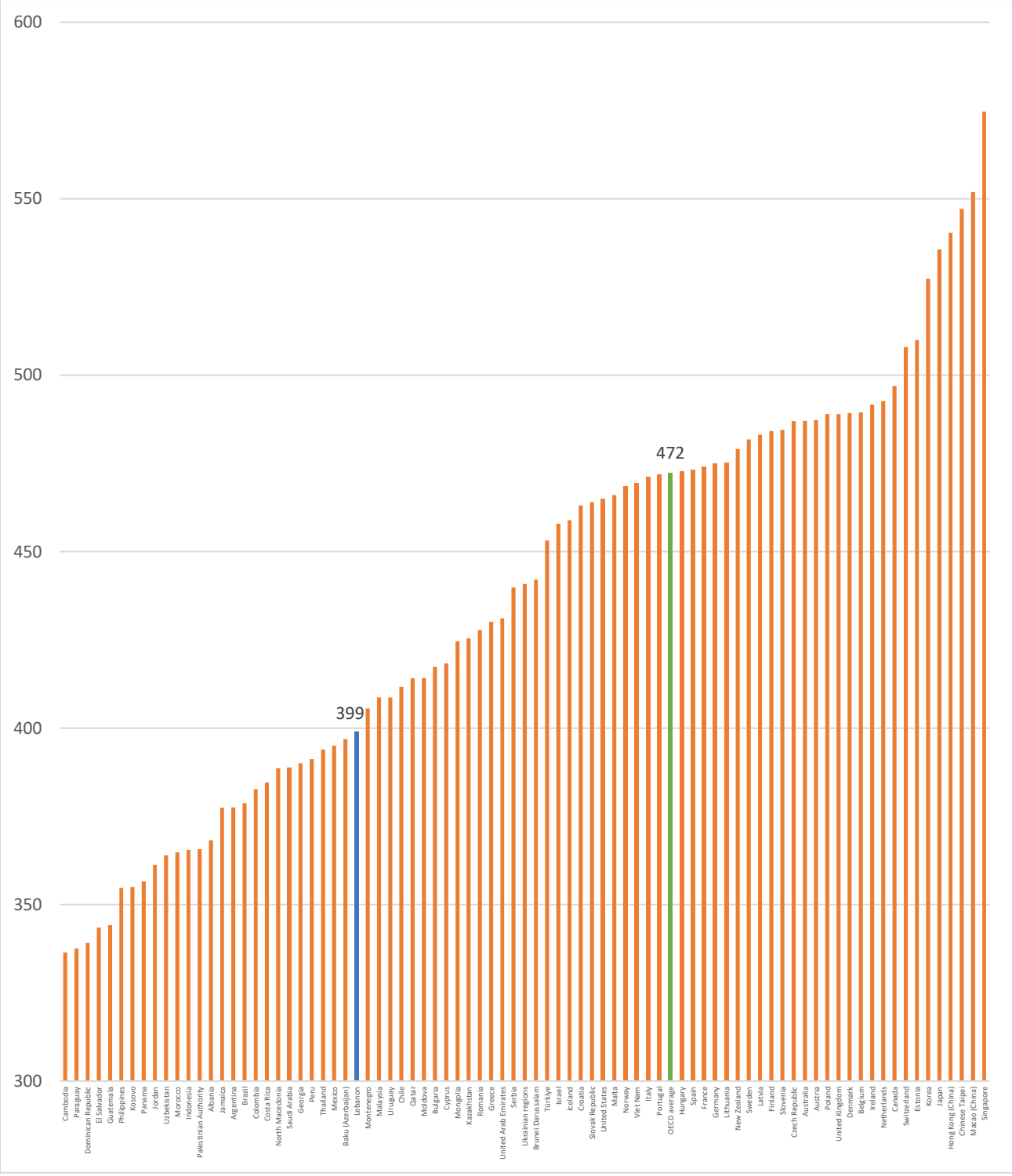
Proficiency level 1b: The lowest proficiency level, Level 1b, indicates a minimal understanding of scientific concepts. Students can recognize basic information but have limited engagement with scientific content, representing an early stage of scientific literacy development. Level 1b students are taking initial steps toward building scientific literacy and skills for future scientific learning and engagement.

Chapter 3. Mathematics performance of students in Lebanon

OVERVIEW OF THE RESULTS

In Lebanon, students achieve on average 399 points in the PISA scale, which is 73 points below the OECD average of 472 points. Due to this, Lebanon ranks in 56th position among the countries and territories participating in PISA. For an international comparison, the countries and territories whose performance was within 50 points of the average of Lebanon, thus being within half a standard deviation of the PISA assessment, were Jamaica, Argentina, Brazil, Colombia, Costa Rica, North Macedonia, Saudi Arabia, Georgia, Peru, Thailand, Mexico, and Baku (Azerbaijan), all of which are below; and Montenegro, Malaysia, Uruguay, Chile, Qatar, Moldova, Bulgaria, and Cyprus, all of which are above. In mathematics, the countries with the highest average scores are Singapore (575 points), Macao (China) (552 points), and Chinese Taipei (547 points); conversely, the countries with the lowest scores are the Dominican Republic (339 points), Paraguay (338 points), and Cambodia (336 points).

Figure 3.1. Average performance in mathematics in PISA 2022



Source: OECD (2023a), Table I.B1.2.1

Within the PISA framework, proficiency levels are defined as a measure of how effectively a student can apply their knowledge in mathematics. Proficiency level 2, in particular, represents the minimum requirements for an individual to function effectively in society. Therefore, it is of significant importance to assess the proportion of students reaching this particular proficiency level, in addition to comparing the distribution across all other levels. Figure 3.2 provides a comparative analysis of the proportions of students at each proficiency level in mathematics in Lebanon, compared with the OECD average.

Figure 3.2. Students at mathematics proficiency levels in Lebanon and on the OECD average

	Lebanon	OECD average	Percentage point difference
Below level 1c	7,6%	0,3%	7,3%
Level 1c	9,5%	2,3%	7,2%
Level 1b	16,2%	9,8%	6,4%
Level 1a	22,4%	18,7%	3,7%
Level 2	22,1%	23,3%	-1,2%
Level 3	14,7%	22,0%	-7,3%
Level 4	6,0%	14,9%	-8,9%
Level 5	1,6%	6,7%	-5,1%
Level 6	0,0%	2,0%	-2,0%

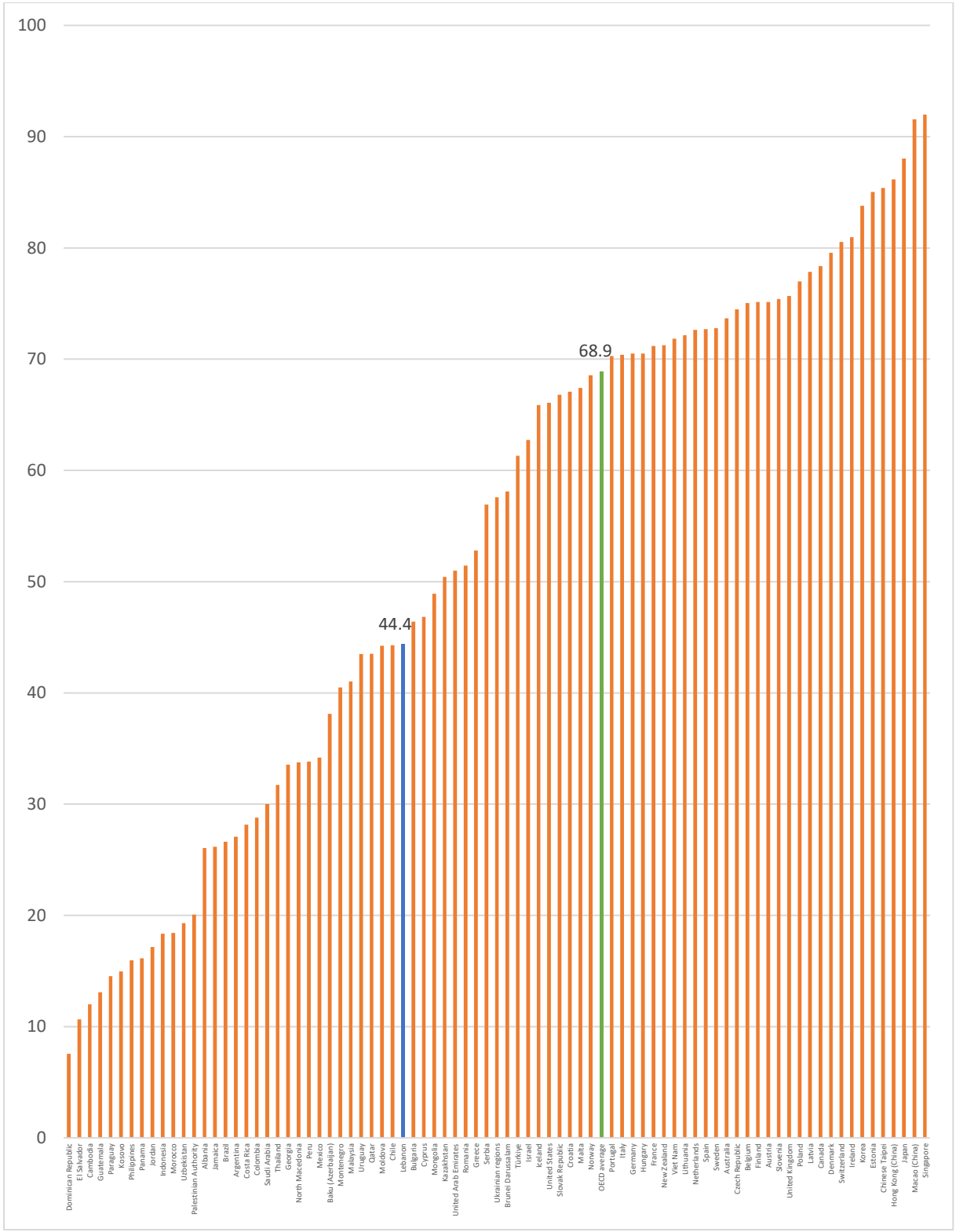
Source: OECD (2023a), Table I.B1.3.1

The figure shows how more students are found in the lower proficiency levels in Lebanon than on the OECD average. The majority of students is found at level 1a (22.4%), while on the OECD average the majority is found at level 2 (23.3%). Only 1.6% of students in Lebanon manage to reach high levels of proficiency such as 5 and 6, while on the OECD average the share of students found at these levels is equal to 8.7%. These results indicate how Lebanese students underperform significantly compared to the OECD average, and how much less students manage to reach a high proficiency and knowledge of mathematics compared to the OECD average. Furthermore, the lower – compared to the OECD average – share of students that manage to

reach level 2 or go above also indicates how students from Lebanon will face significant challenges in the future when entering the labor market.

Figure 3.3 presents the shares of students at proficiency level 2 in the countries and territories participating in the PISA 2022. The countries that present the highest shares are Singapore (92.0%), Macao (China) (91.6%), and Japan (88.0%); conversely, the countries with the lowest ones are Cambodia (12.0%), El Salvador (10.7%), and the Dominican Republic (7.6%). Lebanon presents a share equal to 44.4%, which is 24.5 percentage points below the OECD average of 68.9%. This gap confirms the previous estimations related to proficiency levels, indicating how interventions are needed in the country to increase this share and reduce the challenges encountered by students when finishing education.

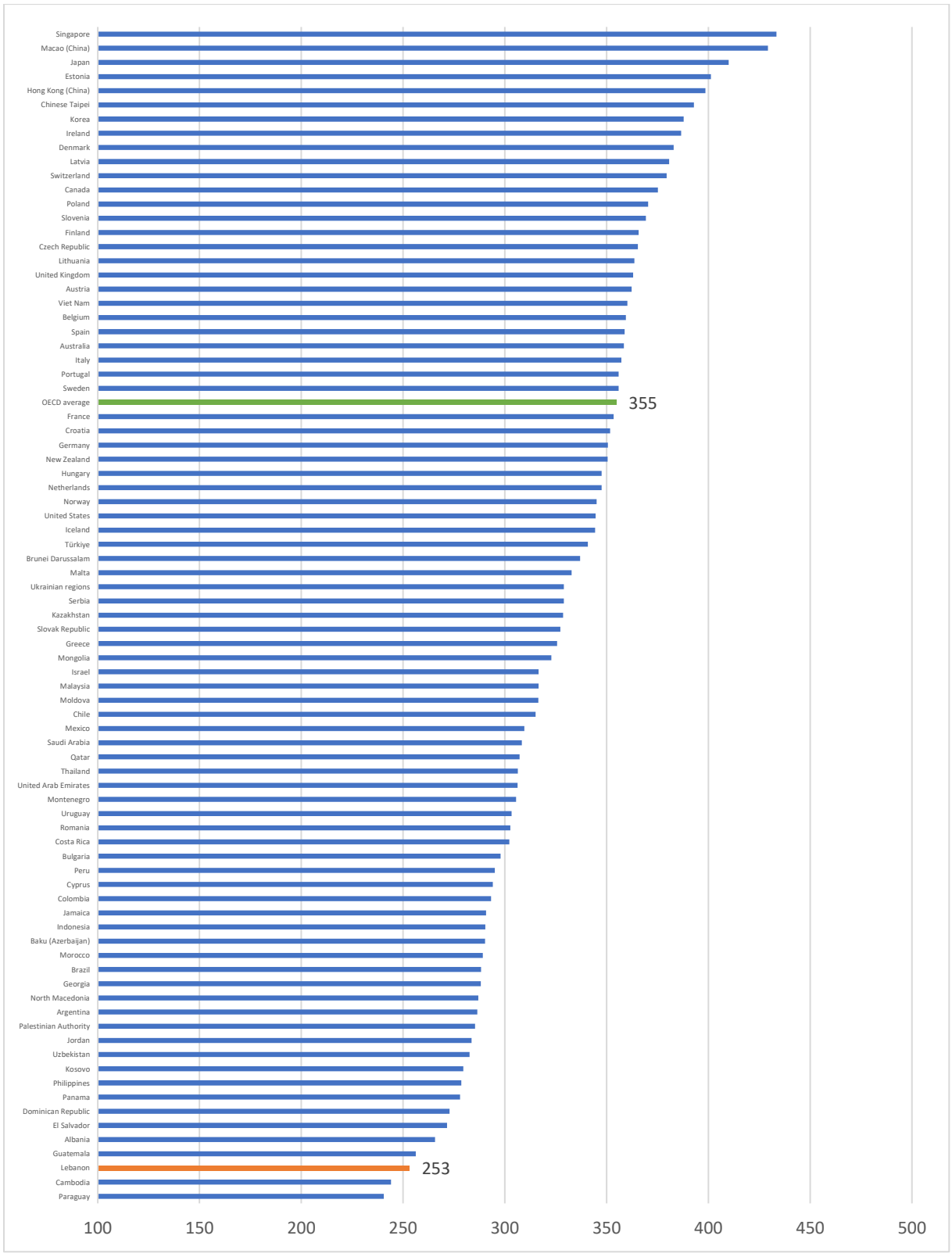
Figure 3.3. Students at proficiency level 2 or above in mathematics



Source: OECD (2023a), Table I.B1.3.1

An insightful approach to evaluating the performance of students involves comparing the 10th percentile of results in mathematics. This comparison allows an assessment of how educational systems address the challenges faced by the most disadvantaged students. Given that low-achieving students may encounter difficulties that may cause their lower performance, educational systems may implement tools to mitigate the impact of these challenges. Figure 3.4 shows the results of the 10th percentiles of achievements in mathematics, thus providing information about the performance of students at the lower end of the achievement scale.

Figure Performance of low-achieving students .3.4 in mathematics (10th percentile of mathematics)

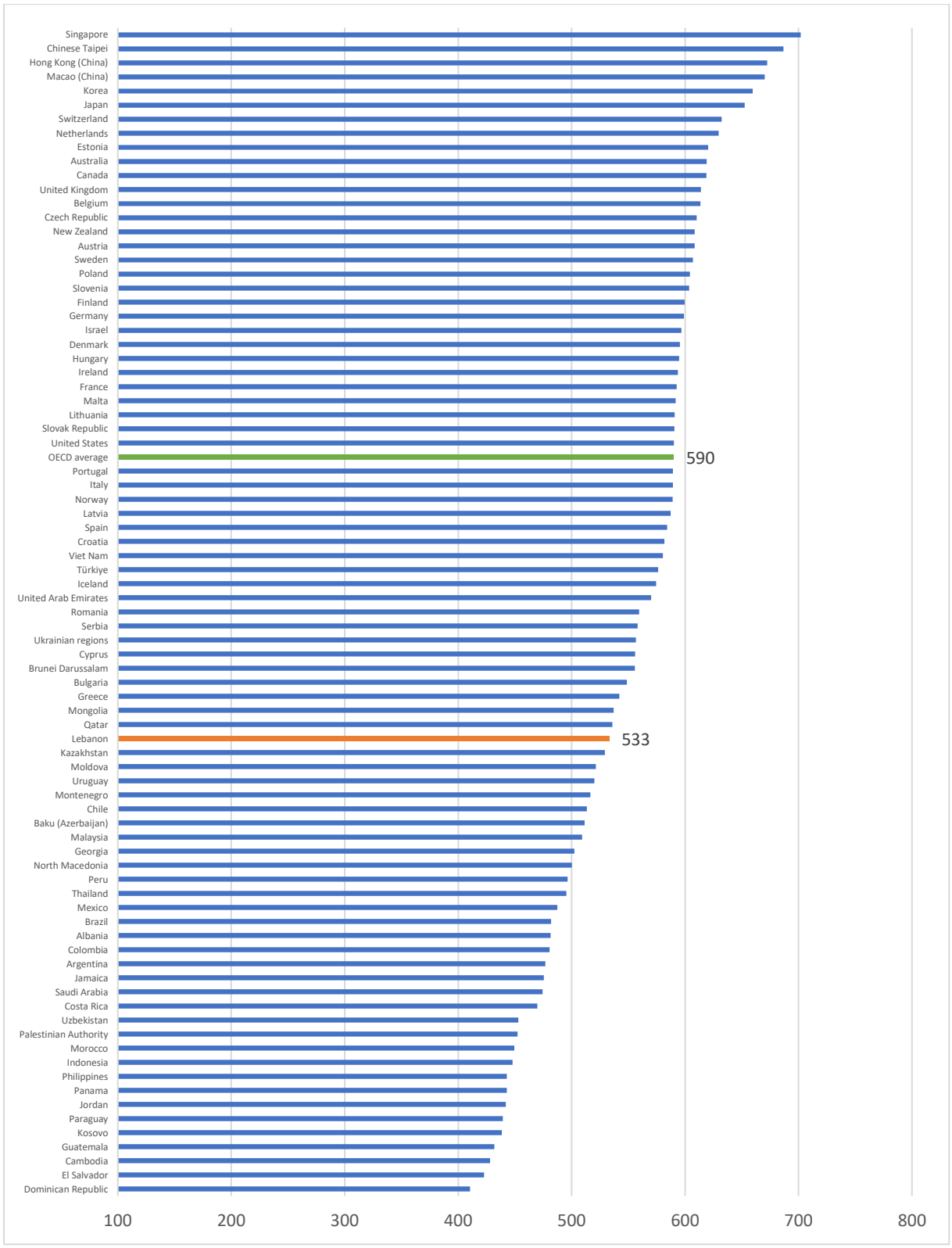


Source: OECD (2023a), Table I.B1.2.1

The figure shows how Lebanese students in the 10th percentile achieve 253 points on average on the mathematics scale, which is more than 100 points below the OECD average of 355. This estimation indicates that the students who encounter the most difficulties (i.e., the ones in the 10th percentile and therefore with the lowest average performance) lag significantly behind the lowest performing students on the OECD average – more than one standard deviation on the PISA scale. Understanding the dynamics may help reduce the gap with the OECD average should be prioritized in order to help the most disadvantaged students reach higher scores and competencies in mathematics.

Another useful analysis to assess students' performance involves comparing the 90th percentile of results in mathematics. This comparison enables an evaluation of how countries rank when considering high-achieving students only. As high-performing students may benefit from advanced coursework or specialized support, it is crucial to understand what may improve their learning experiences, in order to extend their increased opportunities to all students. Figure 3.5 shows the results of the 90th percentiles of achievements in mathematics, thus providing information about the performance of students at the higher end of the achievement scale.

Figure 3.5 Performance of high-achieving students in mathematics (90th percentile of mathematics)

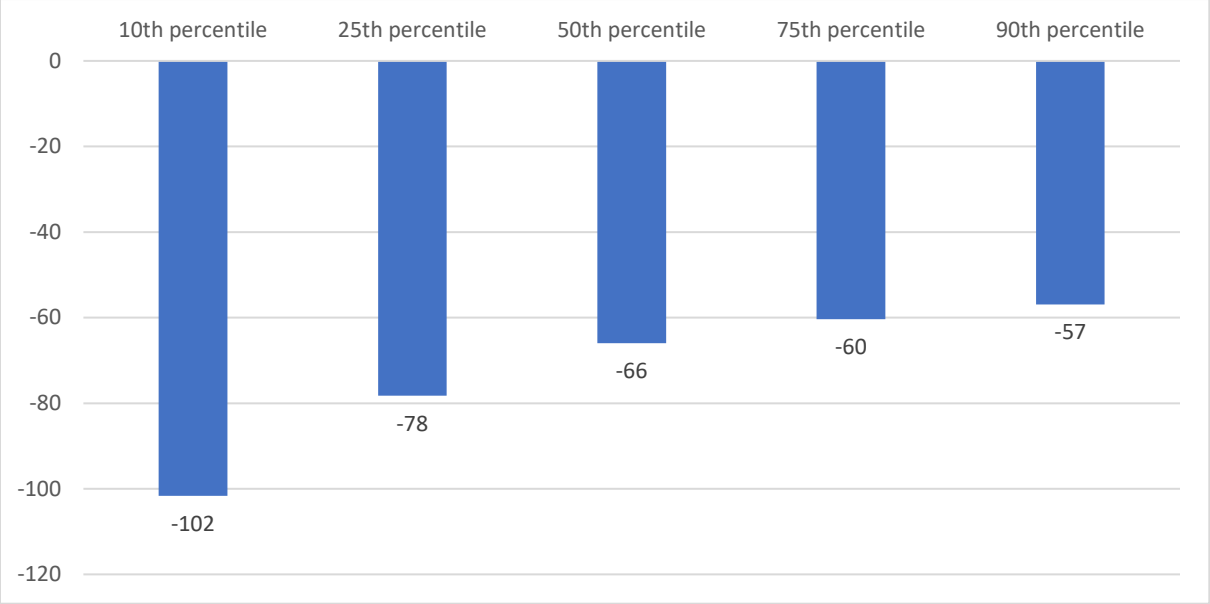


Source: OECD (2023a), Table I.B1.2.1

The figure shows that the highest percentile of mathematics performance has an average score of 533 points in Lebanon, which is below the OECD average, equal to 590 points. As with the 10th percentile, this gap indicates how even the highest performing students in Lebanon encounter significant disparities in the quality of their education compared to the OECD average. Nonetheless, the gap is smaller in magnitude compared to the one separating the lowest-performing students. This indicates how the difference in quality of education is larger at the lower end of student performance, thus affecting disadvantaged students the most. Nevertheless, the existence of a large gap (equal to 57 points) also among the highest performing students indicates how interventions could also help them improve their performance.

A more detailed analysis of the distribution of the results in Lebanon is shown in Figure 3.6. In particular, the figure compares achievements gaps between students at 10th, 25th, 50th, 75th, and 90th percentiles between Lebanon and the OECD average. The results show how as the percentile increases, the gap between the average performance of Lebanese students and the OECD average decreases. This can be seen as an indication that the differences in educational offer and quality are larger when comparing the lower-performing students between Lebanon and the OECD average, while the gaps – albeit substantial – progressively decrease in magnitude as the performance of students increases.

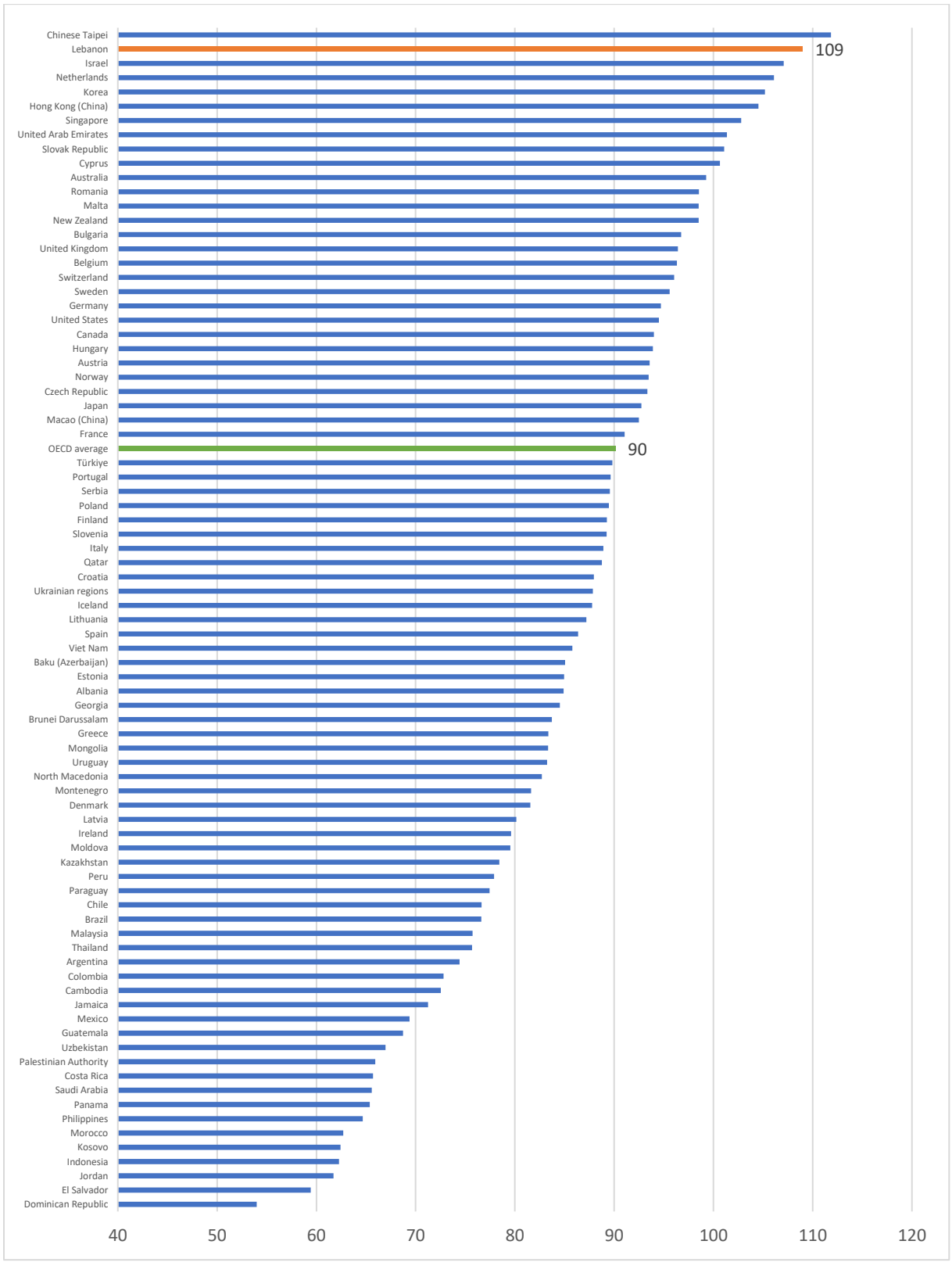
Figure 3.6. Comparison of performance of Lebanese students with the OECD average in mathematics



Source: OECD (2023a), Table I.B1.2.1

Measures of dispersion offer insights into the diversity of results obtained in the mathematics assessment, with higher values indicating greater spread in the results. The PISA assessment provides information on the variance of a country's results, presented in the form of standard deviation for clarity. The assessment was structured to have the OECD's average standard deviation set at the level of 100 points. Consequently, if the variance of results in a particular country or economy surpasses 100 points, it indicates a broader spread of results compared to the OECD average. Figure 3.7 visualizes the standard deviations of selected countries, providing a comparative view of the variability in their mathematics assessment results.

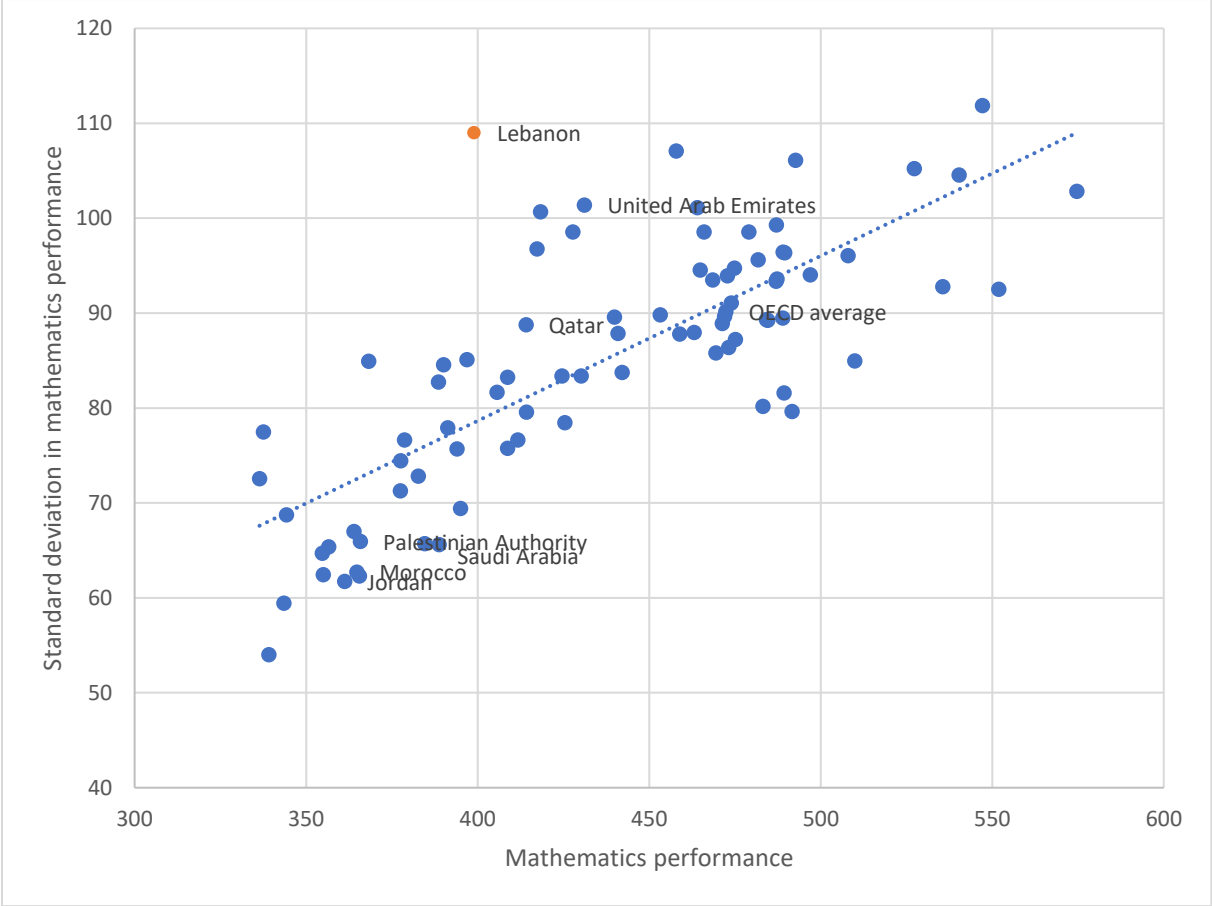
Figure 3.7 Variation in student performance in mathematics



Source: OECD (2023a), Table I.B1.2.1

The results indicate that Lebanon presents a standard deviation in mathematics achievements equal to 109 points, the second highest among the countries and territories taking part in PISA; in comparison, the OECD average is equal to 90 points. This indicates a significant variability in performance in Lebanon, which can be an indication of significant inequalities in terms of opportunities and educational quality. Figure 3.8 presents the relationship between average mathematics achievements and standard deviation in achievements, to check whether there is an association between the overall performance and the variability in the results. The figure shows that Lebanon is among the countries in which the variation is higher than the average overall when compared to the performance. This indicates that, compared to other countries where on average performance and variation go together, the gaps in achievements within the countries are higher than predicted.

Figure 3.8 .Variation against mathematics performance



Source: OECD (2023a), Table I.B1.2.1

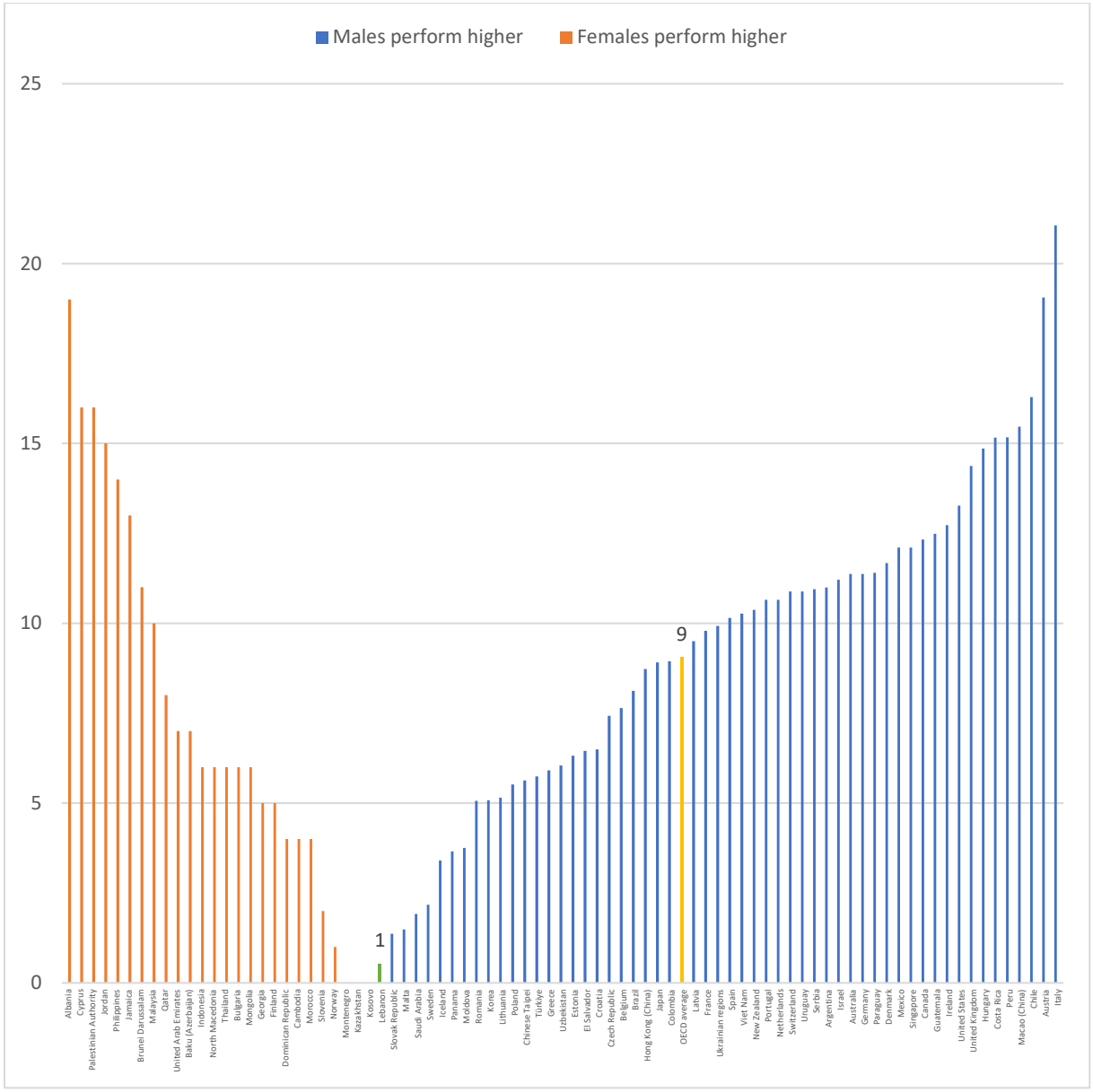
GENDER GAPS IN MATHEMATICS ACHIEVEMENTS

Gender gaps serve as a crucial point for analysis, as they show the possible existing disparities in opportunities offered to male and female students. Additionally, these gaps can offer insights into whether male or female students may require more support in their learning, influenced by varying attitudes or preferences that contribute to the existence of gender gaps. In this section, we will examine gender gaps in mathematics performance within PISA 2022, both in overall performance and across PISA proficiency levels. Unless explicitly stated otherwise, the gender gap is calculated as the difference between male and female scores, signifying the

comparative advantage of males over females or, if negative, indicating a lower performance level among males.

Figure 3.9 presents the gender gap in mathematics achievements. In the majority of countries, males perform higher than females in mathematics, with the largest gap in Italy (21 points) among the countries where males perform higher than females, and the largest gap in Albania (19 points) among the countries where females perform higher than males. In Lebanon, male students perform higher than female students, but only by 1 point on average. On the OECD average, the gap is equal to 9 points. While this can be seen as an indication of the fact that there are no substantial differences in the quality of education provided to male and female students, nor that either gender encounter specific challenges, this result also indicates that possibly students of both genders are significantly disadvantaged compared to the OECD average.

Figure 3.9. Gender gaps in mathematics achievement (males – females)

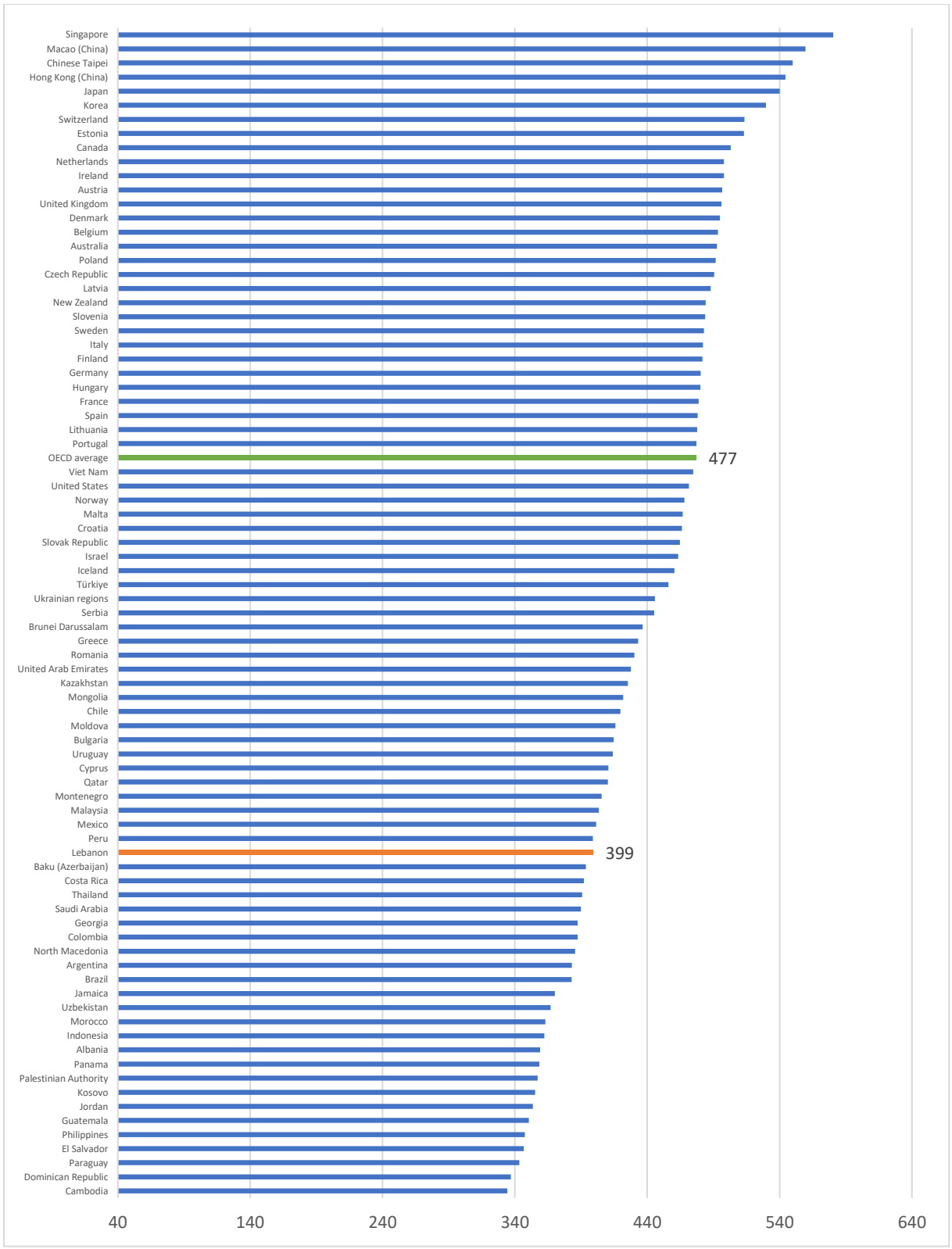


Source: OECD (2023a), Table I.B1.4.17

Figure 3.10 and Figure 3.11 present the average scores of male and female students, respectively, comparing the countries that took part in the 2022 PISA assessment. The results show that male students show an average performance of 399 points, which is 78 points below the OECD average of the performance of male students in mathematics. On the other hand,

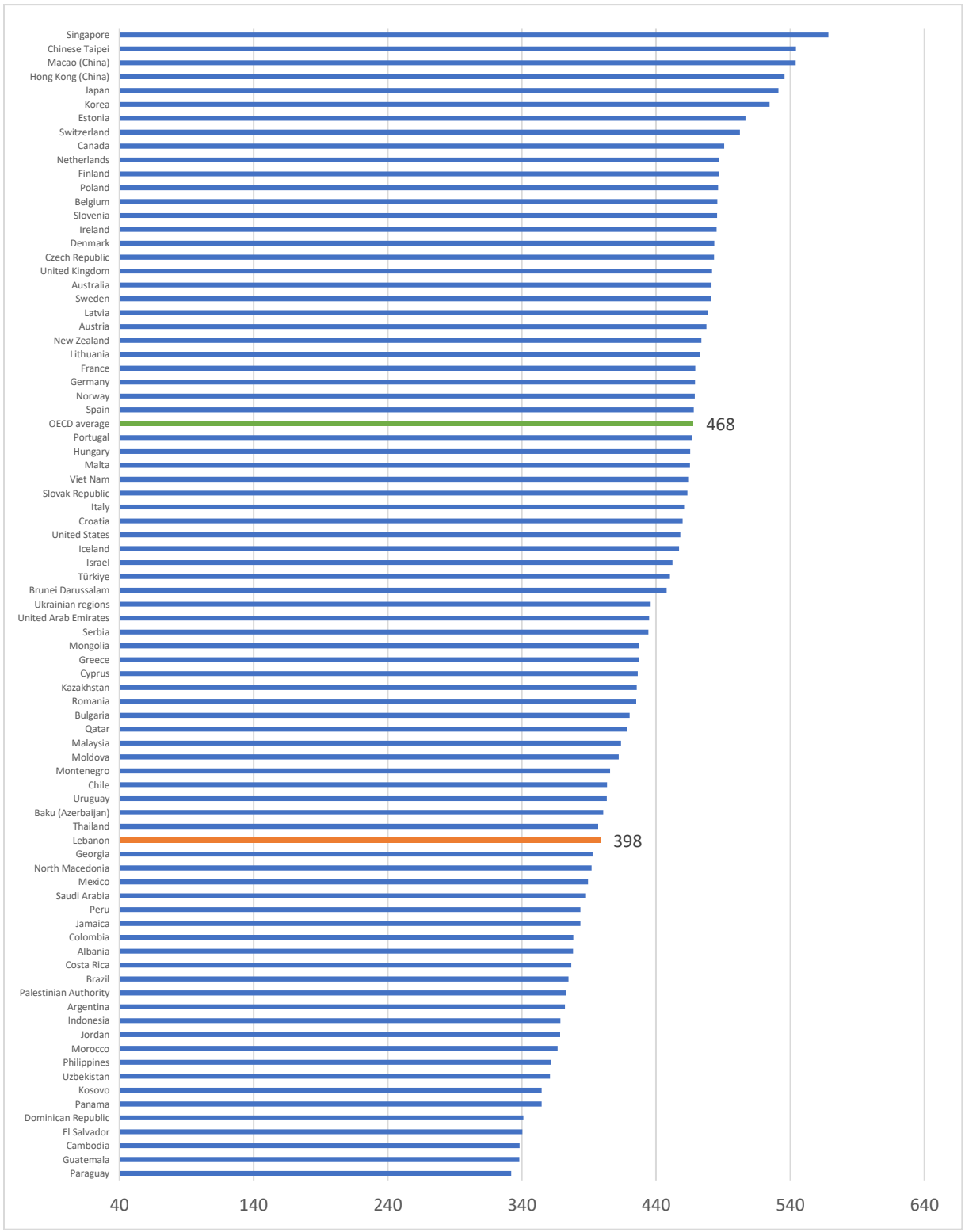
female students exhibit an average performance of 398 points, which is 70 points below the OECD average, which equals 468 points. In general, this indicates that male students are the ones that comparatively show more disadvantage compared to the OECD average. Nevertheless, the small gender gap observed in Lebanon still shows how all students need support and interventions to improve their overall performance.

Figure 3.10. Performance of male students in mathematics



Source: OECD (2023a), Table I.B1.4.17

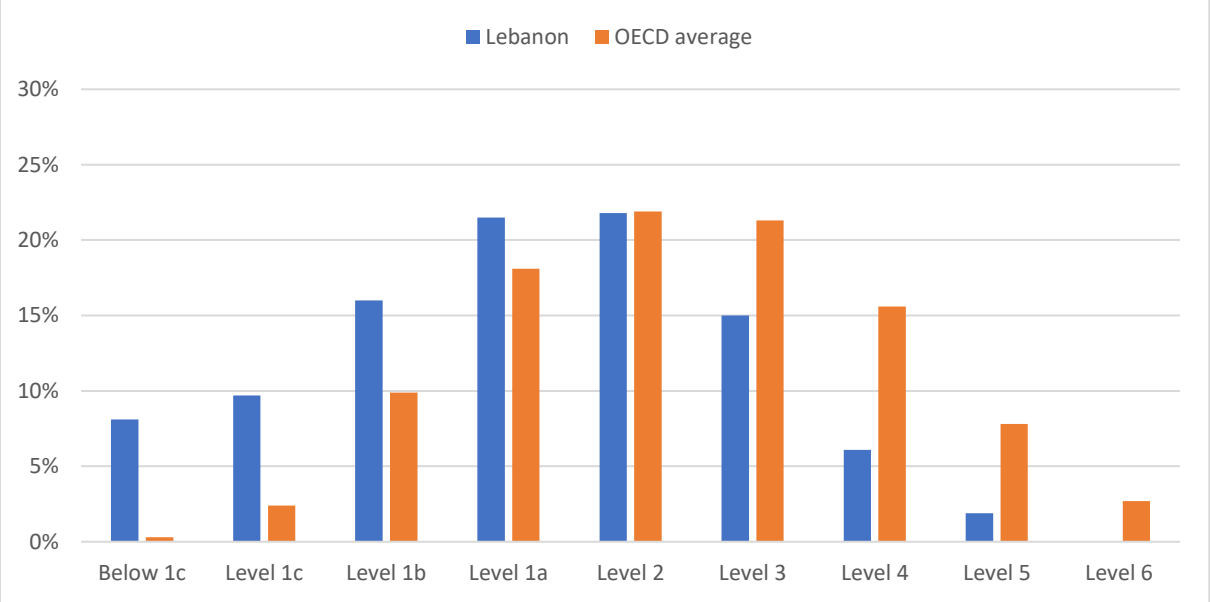
Figure 3.11. Performance of female students in mathematics



Source: OECD (2023a), Table I.B1.4.17

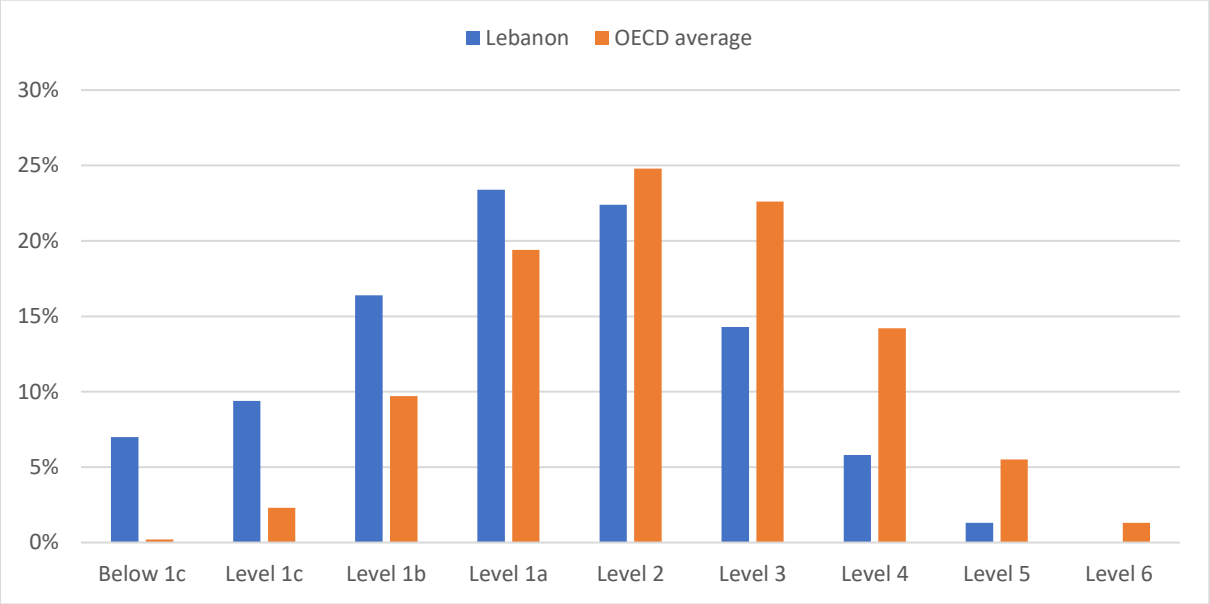
When comparing the gender gaps, it is also useful to look at the distribution of students at each proficiency level by gender. Figure 3.12 and Figure 3.13 compare these distributions for male and female students, respectively. The results, in line with the overall estimations for performance comparing males and females, show that the distributions of both male and female students are to the left of the ones observed on the OECD average. In this respect, no substantial differences are visible between male and female students in Lebanon, with high shares of students found at the lower end of the distributions (levels below 2), and low shares of students found at the higher end of the distribution (levels above 4). As noted above, these estimations show how all students, regardless of gender, need support to improve their performance in mathematics and reduce the difficulties encountered later in life.

Figure 3.12. Percentage of male students at each mathematics proficiency level in Lebanon and OECD average



Source: OECD (2023a), Table I.B1.4.28

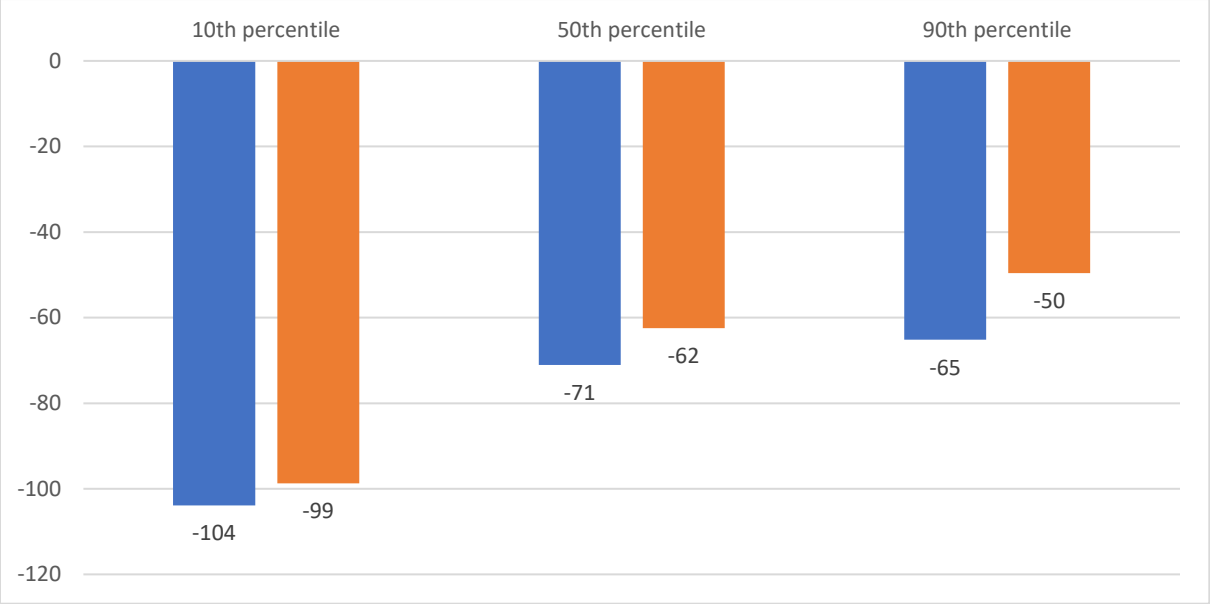
Figure 3.13. Percentage of female students at each mathematics proficiency level in Lebanon and OECD average



Source: OECD (2023a), Table I.B1.4.28

For the sake of comparison between the performance of male and female students, it is also useful to compare how they perform at different percentiles. Figure 3.14 shows the difference in average achievements of male and female students in Lebanon compared to the OECD average. The results show that male and female students in the 10th percentile have a lower performance compared to the OECD average by 104 and 99 points, respectively. Male and female students in the 50th percentile show a gap equal to 71 and 62 points, respectively. Lastly, male and female students in the 90th percentile show a performance that is lower by 65 and 50 points, respectively. As in the pooled data, it can be seen how the gaps with the OECD average decrease as the percentile increases. This confirms how the gap with the OECD average is more sensible for the lowest performing students, who are the ones that need interventions and support the most to be able to improve their performance.

Figure 3.14. Comparison of mathematics performance of Lebanese students against the OECD average



Source: OECD (2023a), Table I.B1.4.17

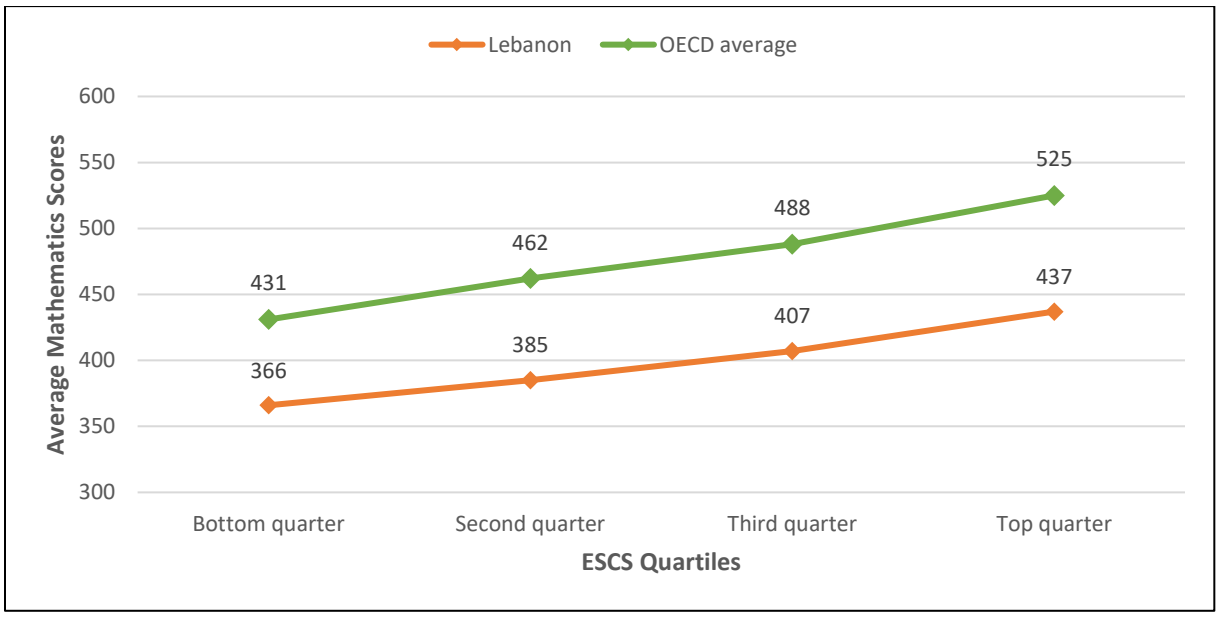
SOCIAL AND ECONOMIC CONTEXTS OF MATHEMATICS PERFORMANCE

Socioeconomic status stands out as a crucial variable in understanding disparities in students' achievements. Given that more affluent students typically have better access to supportive educational tools, it can be anticipated that they will achieve higher results. In the era of distance learning and the pandemic, the impact of socioeconomic status has become more apparent than ever. The most disadvantaged students may lack access to optimal tools for distance learning, potentially resulting in academic setbacks compared to their more affluent counterparts. Additionally, private schools may have been better equipped at the onset of the pandemic, while public schools might not only lack proper tools for distance learning but also face challenges related to teachers' skill gaps in this context.

Figure 3.15 shows the average mathematics performance against the average Economic, Social, and Cultural Status (ESCS) index defined by the PISA framework. The figure shows how the performance of students is higher as the quarter of socioeconomic background increases. In Lebanon, the mathematics score equals on average 366 points in the bottom ESCS quarter (a 65

points difference with the OECD average), 385 points in the second quarter (with a 77 points gap with the OECD average), 407 points in the third quarter (where the gap with the OECD average equals 81 points), and 437 points in the top quarter (where the gap equals 88 points). While the increase in performance over ESCS quarters is observed both in Lebanon and on the OECD average, it can also be noted how the gap between the two also increases with the ESCS quarter. This indicates that more affluent students underperform in Lebanon compared to their counterparts on the OECD average, indicating that the quality of education they have access to may not be enough to provide them with sufficient readiness in school.

Figure 3.15. Mathematics performance and socioeconomic background

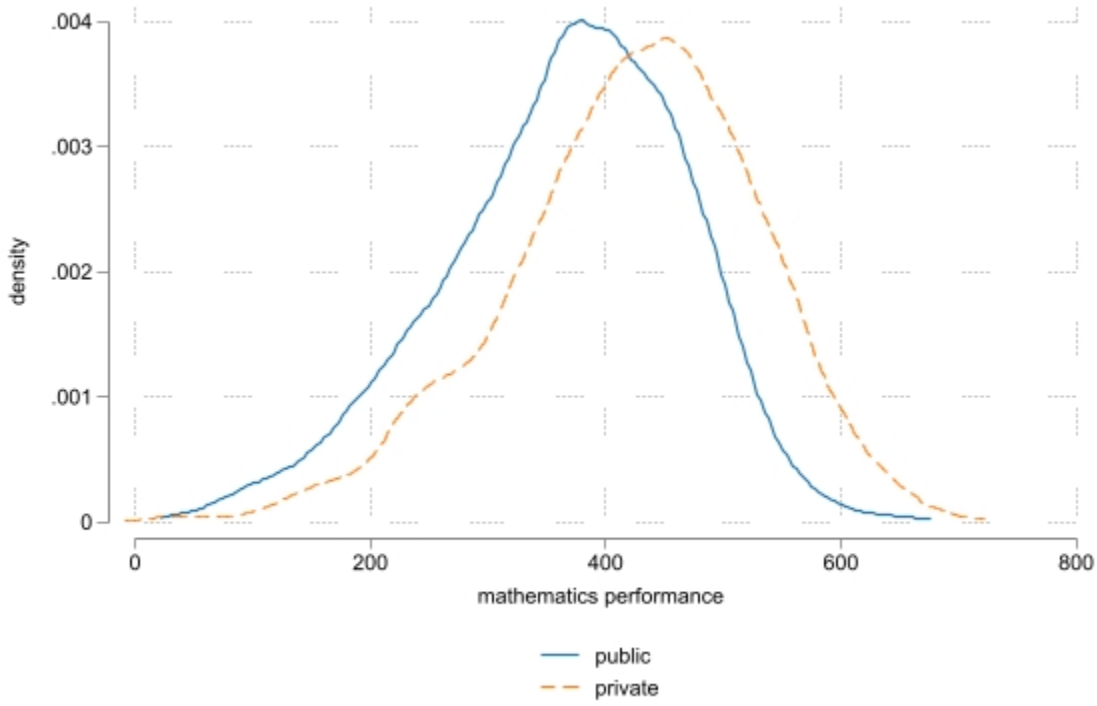


Source: OECD (2023a), Table I.B1.4.3

Figure 3.16 further compares the performance of students in public and private schools. Due to the fact that more affluent student may self-select into private schools, these may be able to provide higher quality education and better learning resources. Therefore, it is important to investigate to what extent the gap between the performance of students in public and private schools exists and is significant, given that it can indicate the existence of significant disparities in opportunities given to students. In Lebanon, while on average students from private schools exhibit a higher mathematics performance than students from public schools, it can also be seen

how the large variability in results leads some students from private schools to also perform significantly lower than the average of public school students.

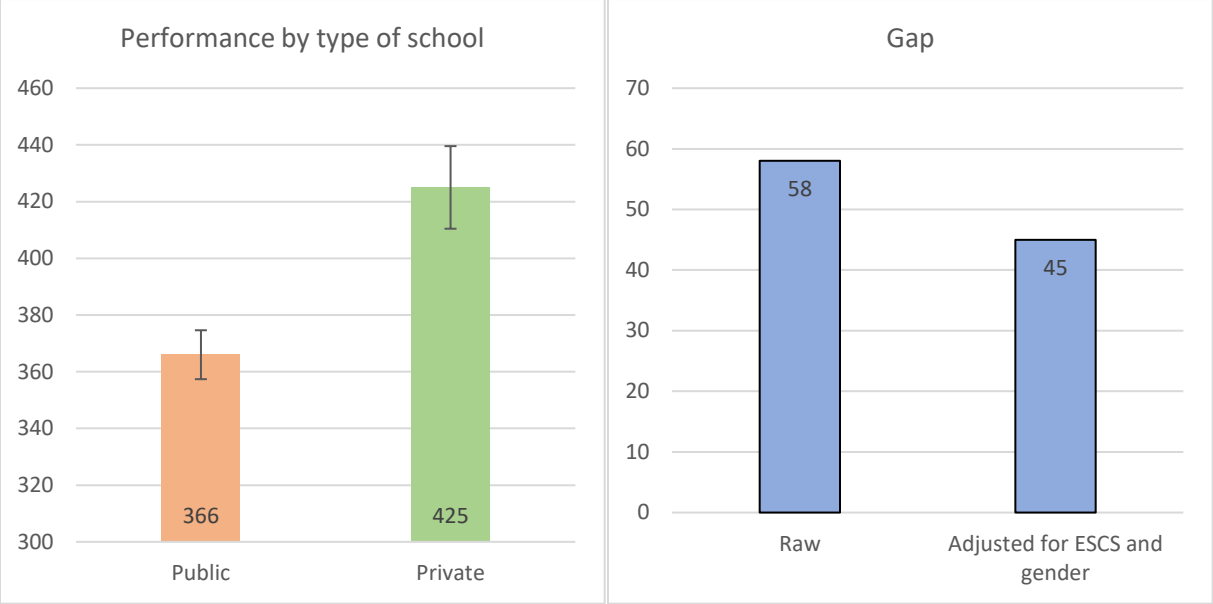
Figure 3.16. Mathematics performance of students in public and private schools in Lebanon



Source: own estimations based on PISA 2022 microdata

Furthermore, Figure 3.17 shows the average performance and the gap between the performance of students in public and private schools (both raw and after controlling for ESCS and gender). On average, students from public schools achieve 366 points in mathematics, compared to 425 points for students from private schools. The gap is statistically significant and equal to 58 points. Notably, after controlling for ESCS and gender, the gap remains significant and equal to 45 points.

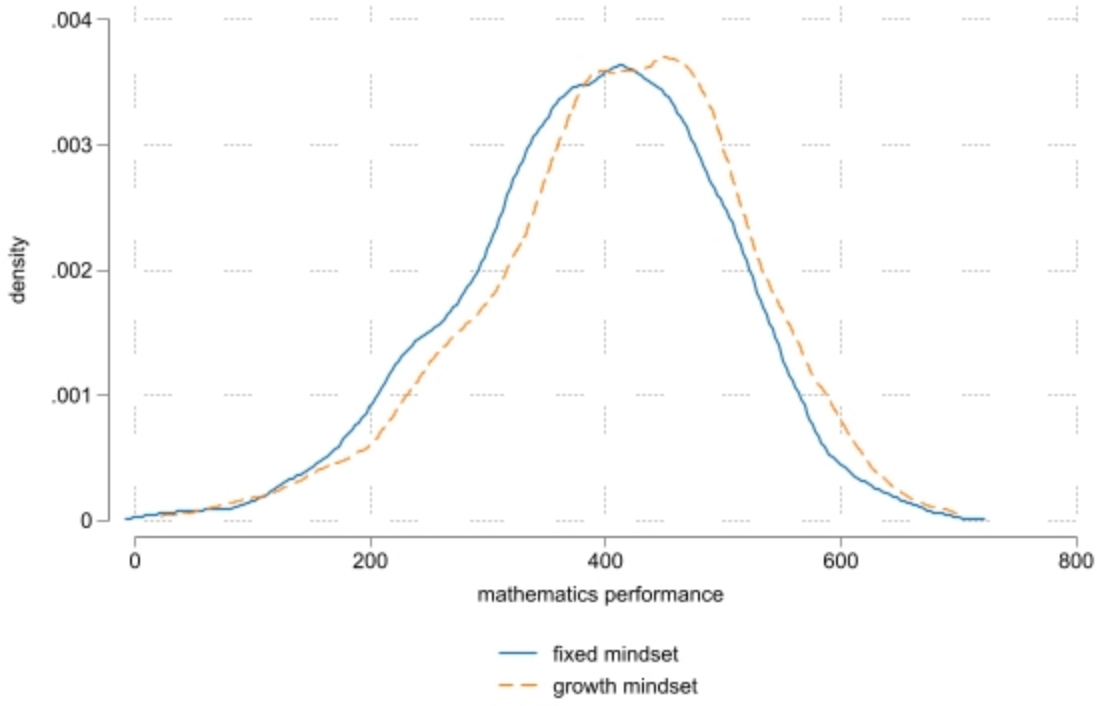
Figure 3.17. Mathematics performance gap between students in public and private schools



Source: own estimations based on PISA 2022 microdata

The PISA questionnaire also includes the question "*Your intelligence is something about you that you cannot change very much*", to which the student can either disagree (strongly or not) or agree (strongly or not). If the student disagrees, according to the PISA framework they are classified as having a growth mindset; otherwise, they are labelled as having a fixed mindset. Given the importance of attitudes and motivation in influencing achievements, it is important to assess whether the performance of students differs significantly between these two mindsets. Figure 3.18 shows the performance of students based on their mindset. Figure 3.19 shows the average mathematics score based on growth mindset, and whether the gap is significant in influencing achievements (both raw and after controlling for ESCS and gender).

Figure 3.18. Growth mindset and mathematics performance



Source: own estimations based on PISA 2022 microdata

Figure 3.19. Performance gap in mathematics between students with and without a growth mindset

Source: own estimations based on PISA 2022 microdata

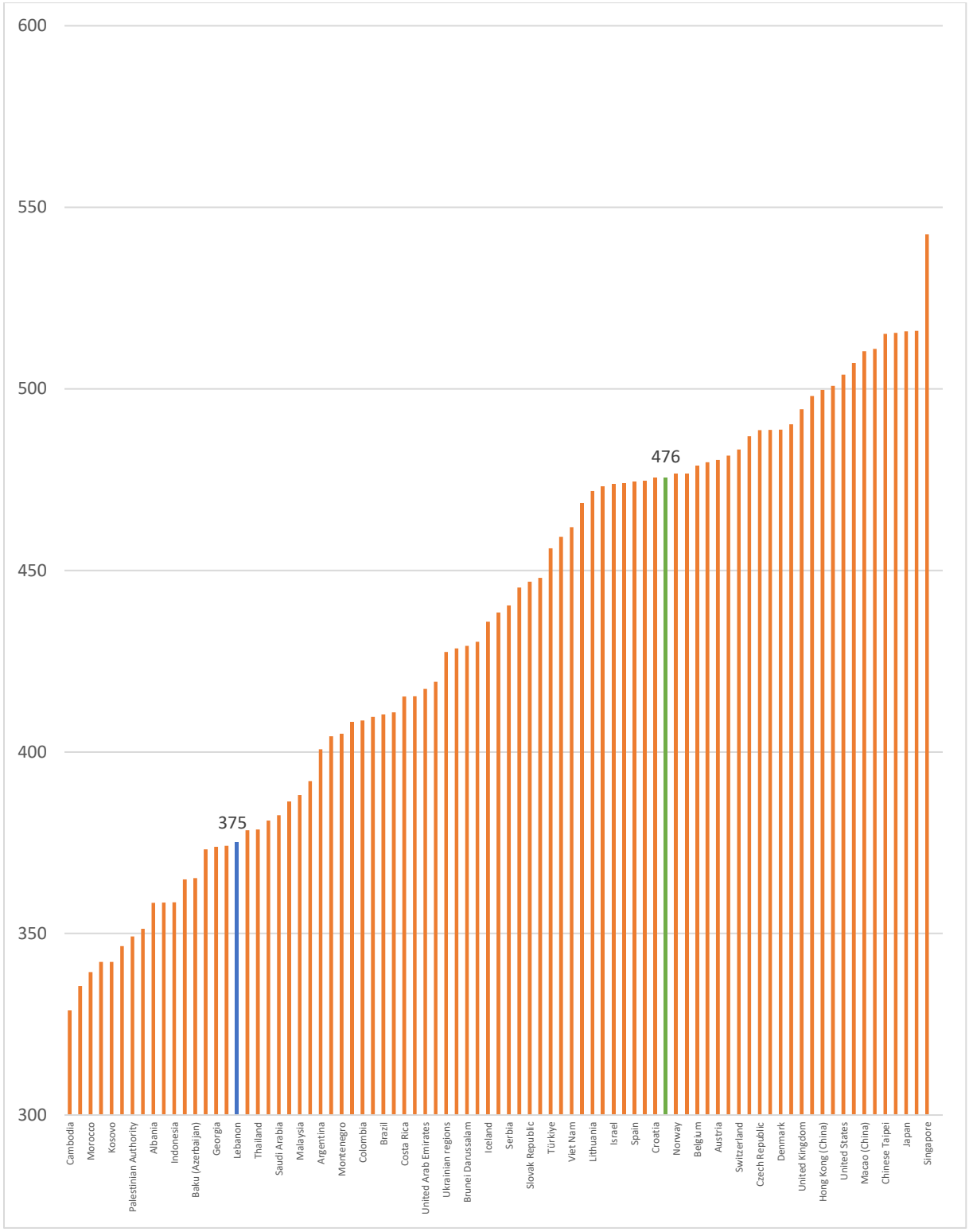
The estimates indicate that students classified as having a growth mindset according to the question about their intelligence achieve on average 410 points in mathematics, compared to 391 of students with a fixed mindset. The gap equals 19 points and is statistically significant in its association with mathematics achievements. Importantly, after controlling for ESCS and gender, the gap remains significant even though it decreased in magnitude to 14 points. Therefore, the results show how it is crucial to create and develop a growth mindset in students, as it may be associated with significantly higher scores even after controlling for economic and demographic indicators.

Chapter 4. Reading performance of students in Lebanon

OVERVIEW OF THE RESULTS

In Lebanon, students achieve on average 375 points in the PISA scale, which is 101 points below the OECD average of 476 points. Due to this, Lebanon ranks in 66th position among the countries and territories participating in PISA. For an international comparison, the countries and territories whose performance was within 50 points of the average of Lebanon, thus being within half a standard deviation of the PISA assessment, were the Dominican Republic, Albania, North Macedonia, Indonesia, El Salvador, Baku (Azerbaijan), Paraguay, Georgia, and Guatemala whose performance is below Lebanon's; Mongolia, Thailand, Cyprus, Saudi Arabia, Kazakhstan, Malaysia, and Panama whose performance is above Lebanon's. In reading, the countries with the highest average scores are Singapore (543 points), Ireland (516 points), and Japan (516 points); conversely, the countries with the lowest scores are Morocco (339 points), Uzbekistan (336 points), and Cambodia (329 points).

Figure 4.1. Average performance in reading in PISA 2022



Source: OECD (2023a), Table I.B1.2.2

Within the PISA framework, proficiency levels are defined as a measure of how effectively a student can apply their knowledge in reading. Proficiency level 2, in particular, represents the minimum requirements for an individual to function effectively in society. Therefore, it holds significant importance to assess the proportion of students reaching this particular proficiency level, in addition to comparing the distribution across all other levels. Figure 4.2 provides a comparative analysis of the proportions of students at each proficiency level in reading in Lebanon, compared with the OECD average.

Figure 4.2. Students at reading proficiency levels in Lebanon and on the OECD average

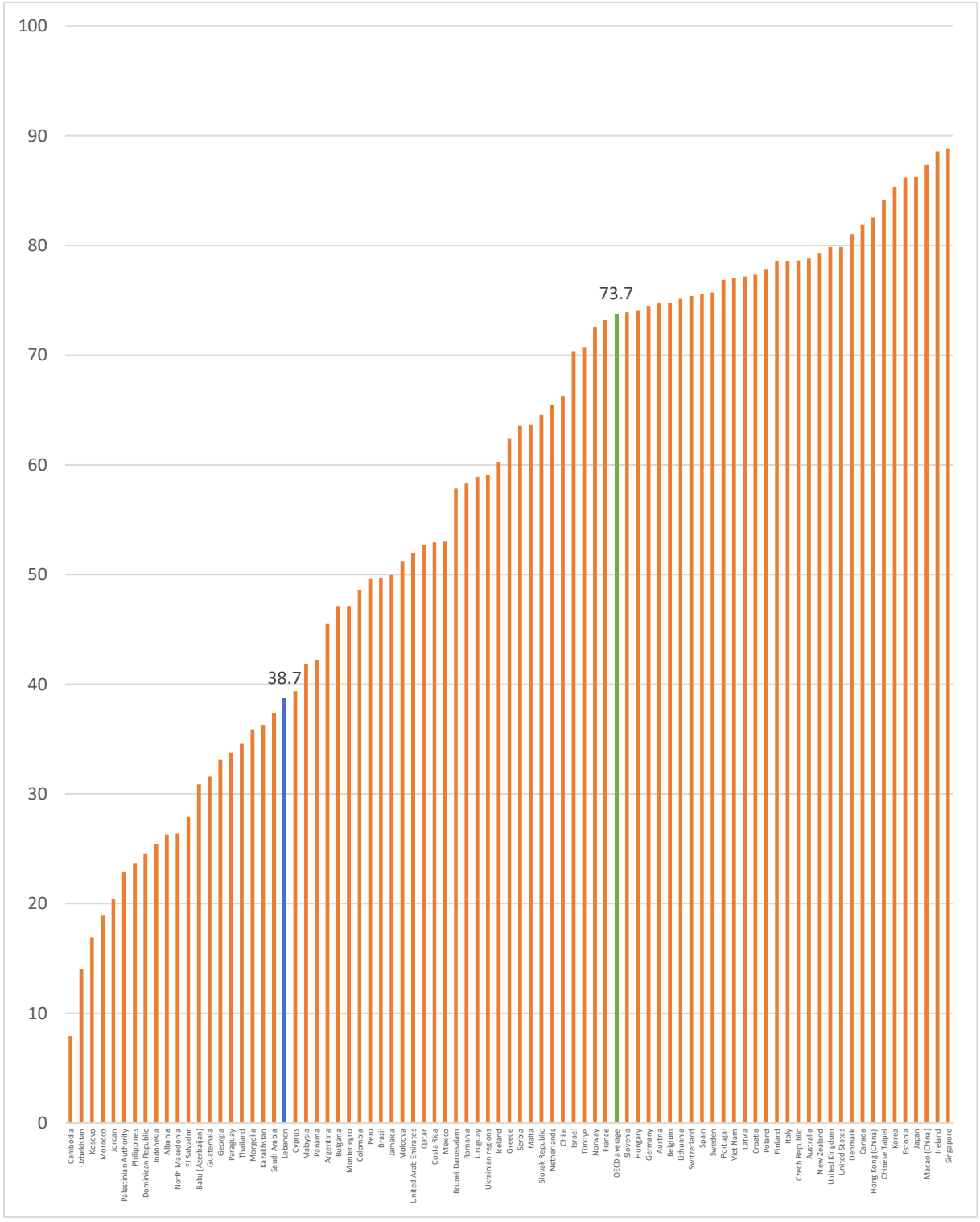
	Lebanon	OECD average	Percentage point difference
Below level 1c	4,1%	0,2%	3,9%
Level 1c	11,4%	1,9%	9,5%
Level 1b	21,0%	7,6%	13,4%
Level 1a	24,8%	16,6%	8,2%
Level 2	21,0%	24,4%	-3,4%
Level 3	12,5%	25,3%	-12,8%
Level 4	4,5%	16,9%	-12,4%
Level 5	0,7%	6,0%	-5,3%
Level 6	0,0%	1,2%	-1,2%

Source: OECD (2023a), Table I.B1.3.2

The figure shows that more students are found in the low proficiency levels in Lebanon compared to the OECD average. In the latter, 7.2% of students are found at the very high levels of proficiency (namely 5 and 6), while in Lebanon this share equals only 0.7%. Conversely, 61.3% of students are found below level 2 in Lebanon, which is larger than what is observed on the OECD average of 26.3%. This shows that students in Lebanon experience more challenges than the average student from an OECD country, which prevents them from reaching high levels of reading proficiency and instead leaving many of them in the low proficiency levels. Given the importance of reading proficiency for performing properly in education and the labor market, it is important to intervene to reduce these gaps.

Figure 4.3 presents the shares of students at proficiency level 2 in the countries and territories participating in the PISA 2022. The countries that present the highest shares are Singapore (88.8%), Ireland (88.6%), and Macao (China) (87.4%); conversely, the countries with the lowest ones are Kosovo (16.9%), Uzbekistan (14.1%), and Cambodia (7.9%). Lebanon presents a share equal to 38.7%, which is 35 percentage points below the OECD average of 73.7%.

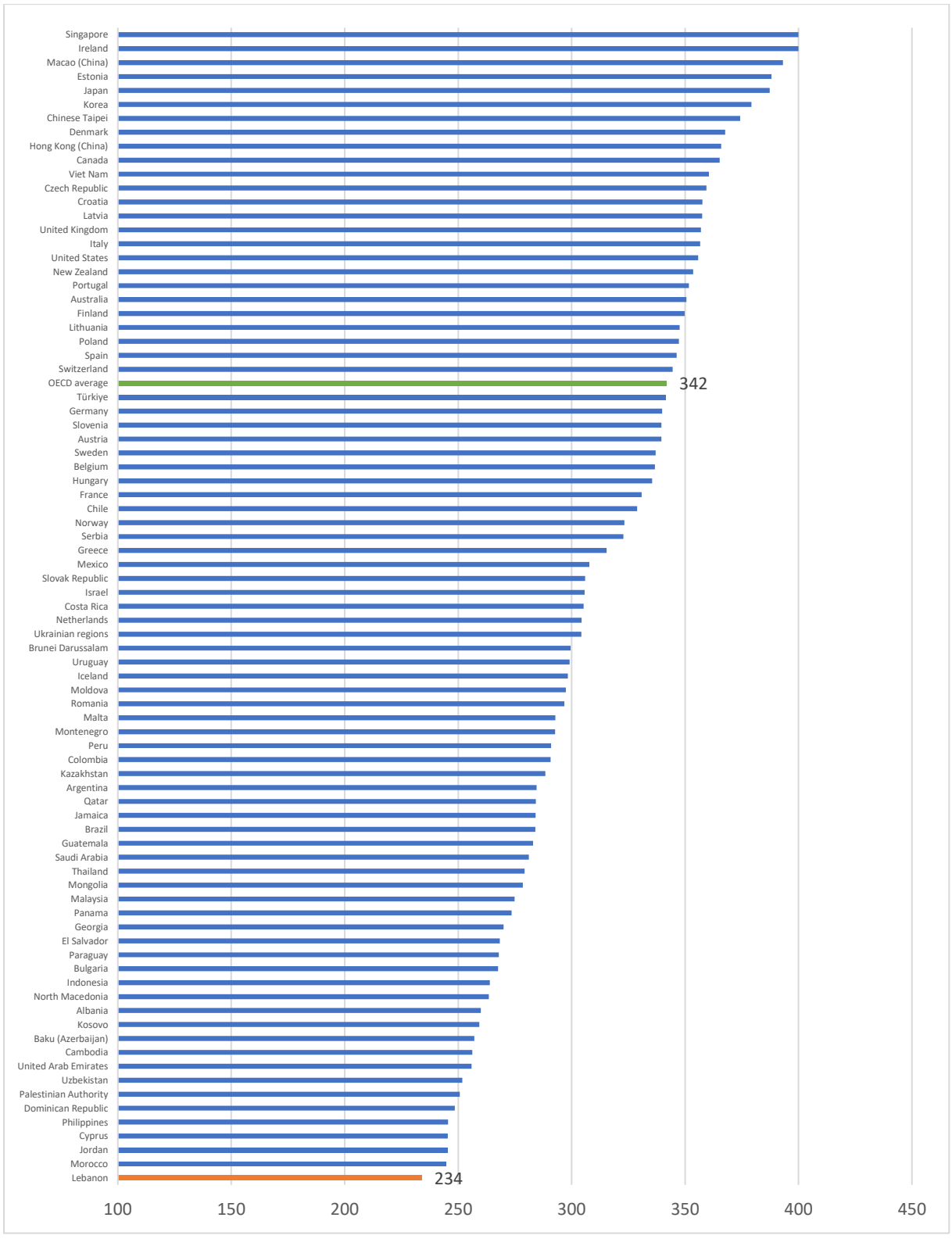
Figure 4.3. Students at proficiency level 2 or above in reading



Source: OECD (2023a), Table I.B1.3.2

Another useful measure in order to compare the performance of students between Lebanon and the OECD average is the comparison of the 10th percentile of results in reading. This allows an assessment of how educational systems may be able to reduce the challenges faced by the most disadvantaged students. In particular, interventions may be needed to mitigate the challenges encountered by the students who show the lowest scores. Figure 4.4 shows the results of the 10th percentiles of achievements in reading, thus providing information about the performance of students at the lower end of the achievement scale.

Figure 4.4Performance of low-achieving students in reading (10th percentile of reading)

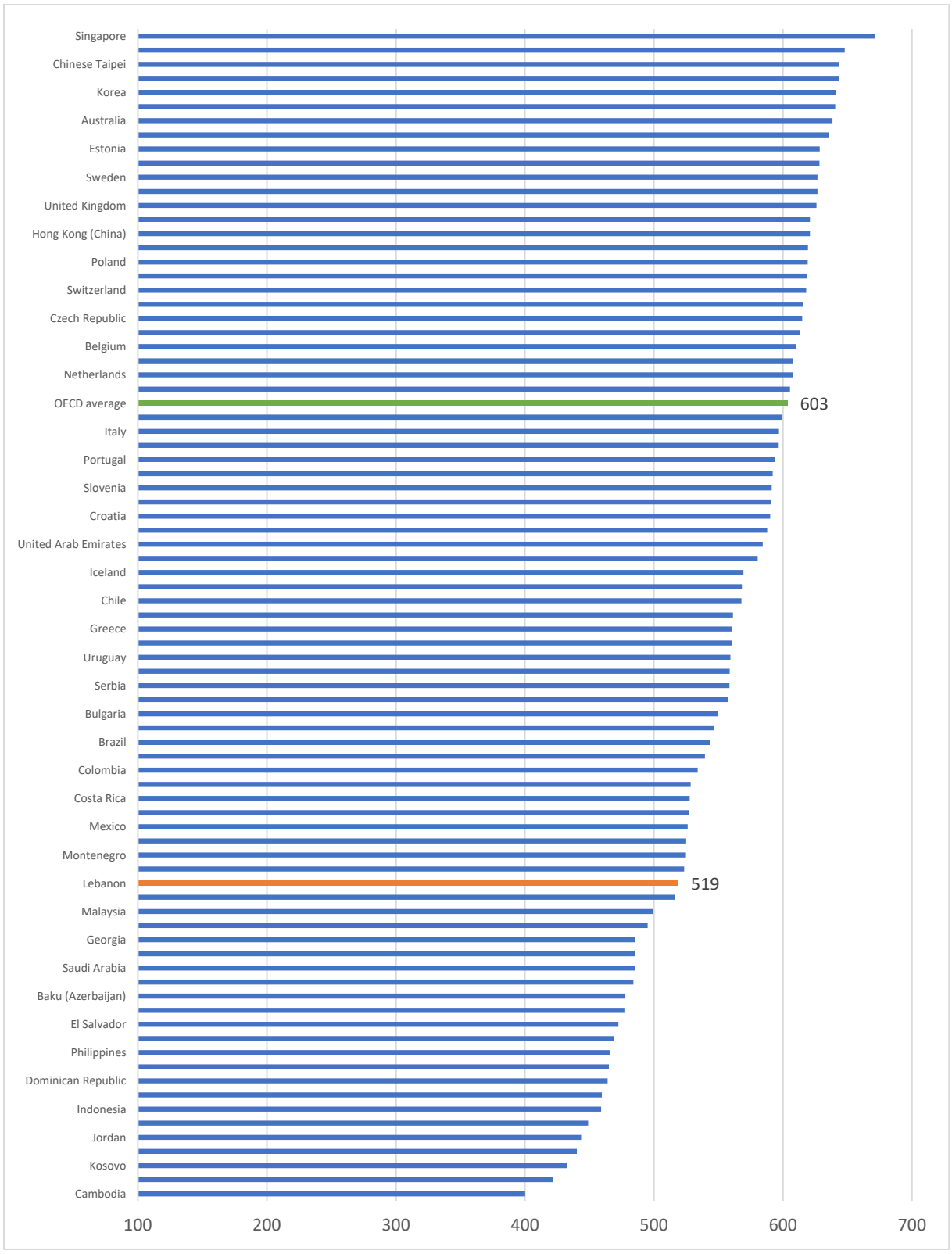


Source: OECD (2023a), Table I.B1.2.2

The figure shows how Lebanese students in the 10th percentile are the ones with the lowest average among the countries participating in PISA. In particular, the average student from the 10th percentile in Lebanon has an average reading score of 234 points. In comparison, the OECD average for this indicator equals 342 points, which amounts to a 108 points gap for Lebanon. This large difference – more than one standard deviation on the PISA scale – shows how the students that encounter the most difficulties are significantly behind the average of the OECD countries, indicating an urgent need of interventions to reduce their challenges and improve their educational performance.

Another useful analysis to assess students' performance involves comparing the 90th percentile of results in reading. This comparison enables an evaluation of how countries rank when considering high-achieving students only. Given that high-performing students may benefit from advanced coursework, increased engagement, or specialized support, it is crucial to understand what may drive their learning experience to extend their opportunities to all students. Figure 4.5 shows the results of the 90th percentiles of achievements in reading, thus providing information about the performance of students at the higher end of the achievement scale.

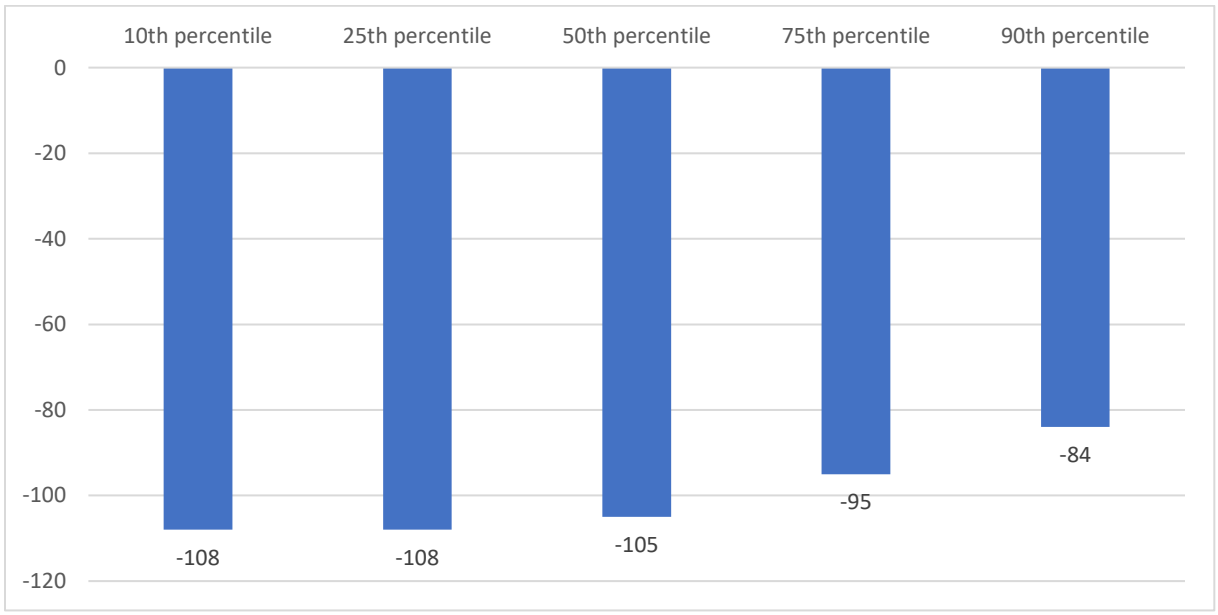
Figure 4.5. Performance of high-achieving students in reading (90th percentile of reading)



Source: OECD (2023a), Table I.B1.2.2

The figure shows that the highest performing students in the 90th percentile achieve an average reading score of 519 points in Lebanon, which is 84 points below the OECD average. As in the case of mathematics, it can be noted how the gap – although large in magnitude – is smaller than the one observed among the students in the 10th percentile. This indicates how the disparities observed between Lebanon and the OECD average are larger for the most disadvantaged and lower-performing students. A more detailed analysis of the distribution of the results in Lebanon is shown in Figure 4.6. In particular, the figure compares achievements gaps between students at 10th, 25th, 50th, 75th, and 90th percentiles between Lebanon and the OECD average. The results indicate that, similar to the case of mathematics and in line with the previous exhibits, the gap between the performance of Lebanese students and the OECD average decreases as the percentile increases.

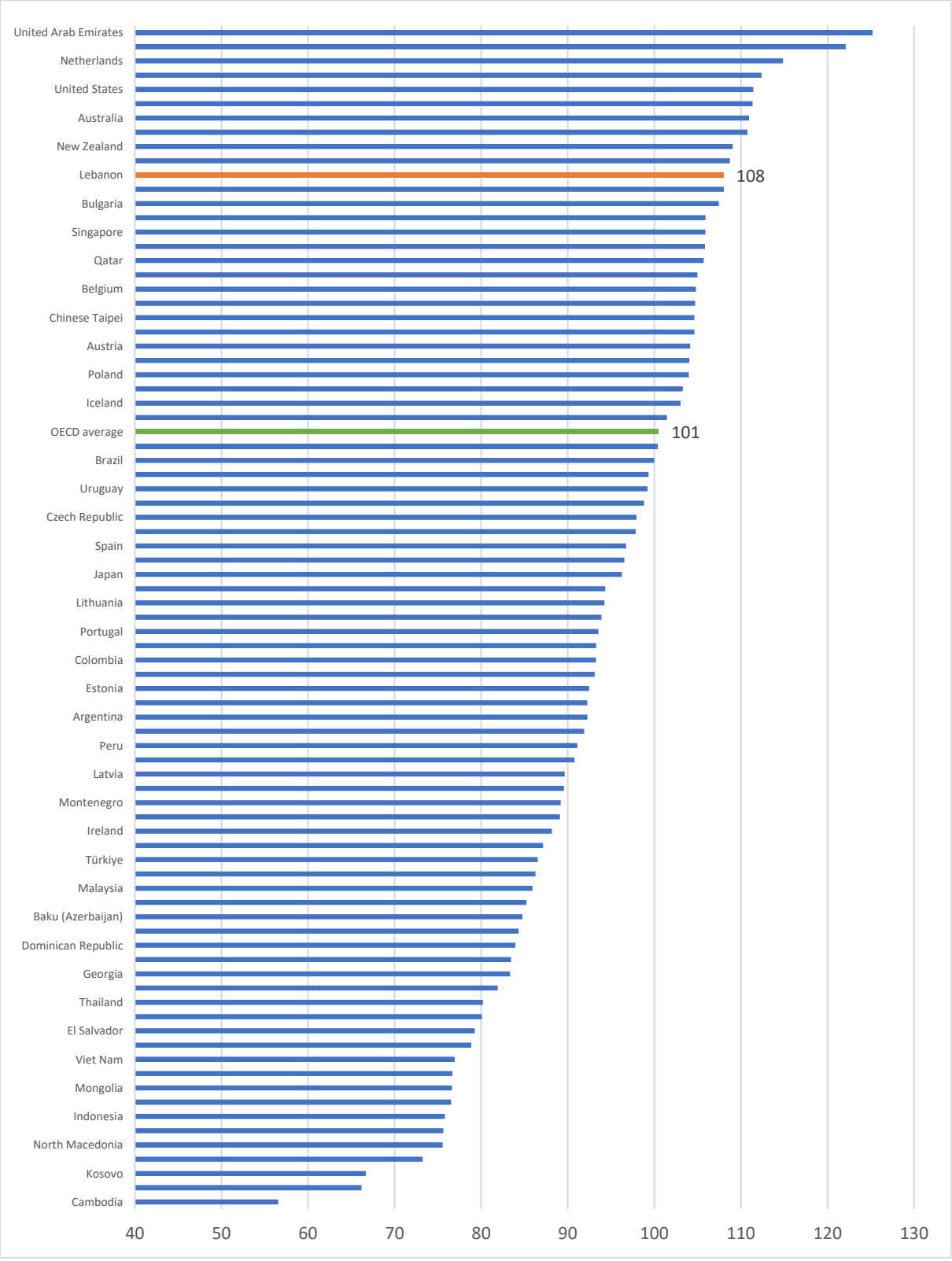
Figure 4.6. Comparison of performance of Lebanese students with the OECD average in reading



Source: OECD (2023a), Table I.B1.2.2

The measures of variation in performance offer indications about the diversity of results obtained in the reading assessment, with higher values indicating greater spread in the results. The PISA assessment provides information on the variance of a country's results, presented in the form of standard deviation for clarity. The assessment was structured to have an OECD average standard deviation set at the level of 100 points. Consequently, if the variance of results in a particular country or economy surpasses 100 points, it indicates a broader spread of results compared to the OECD average. Figure 4.7 visualizes the standard deviations of selected countries, providing a comparative view of the variability in their reading assessment results.

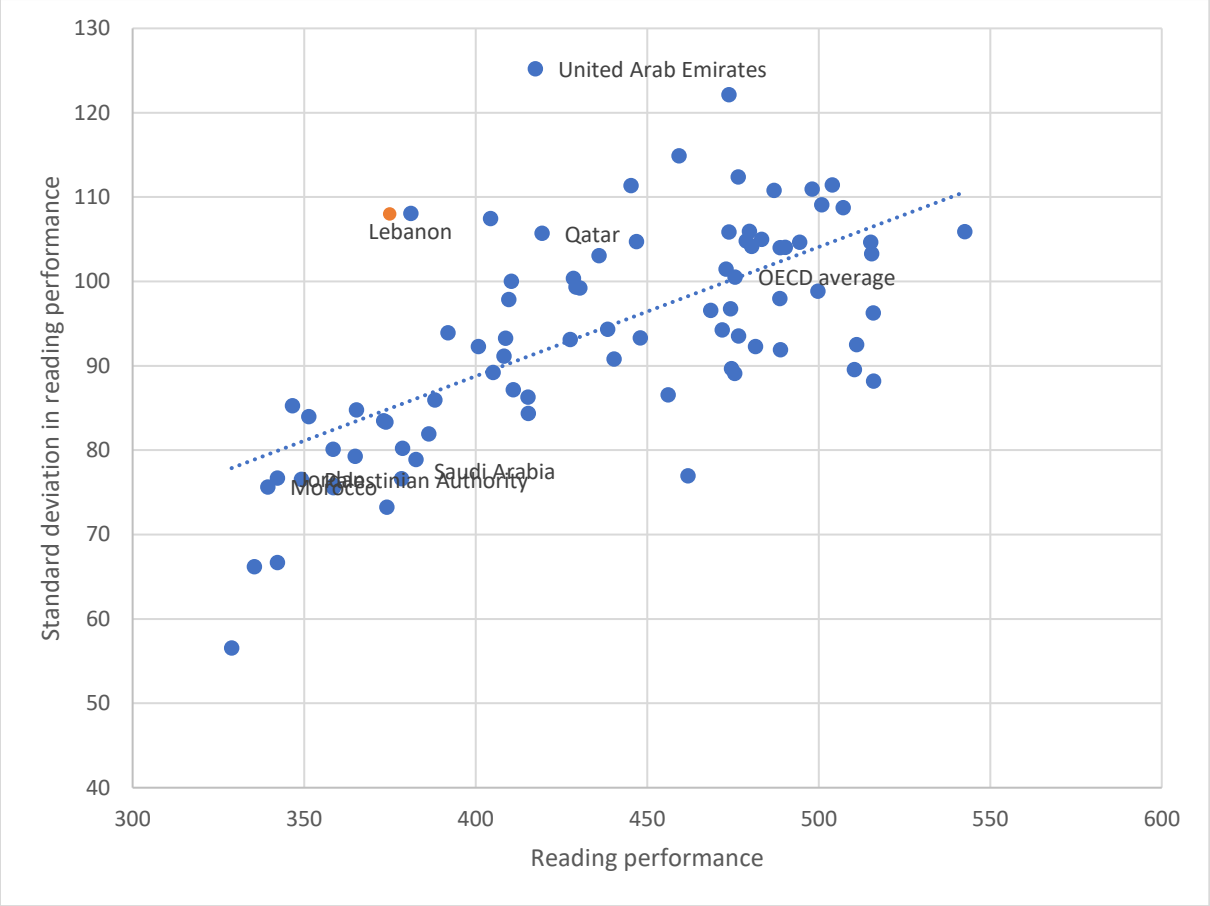
Figure 3.7 Variation in student performance in reading



Source: OECD (2023a), Table I.B1.2.2

The results indicate that in Lebanon the standard deviation in reading achievements is equal to 108 points, which is 7 points above the OECD average of 101 points. This shows how Lebanon is a country where there is more variability in achievements than on average, which could be a sign of inequalities in access to high quality education. Figure 4.8 presents the relationship between average reading achievements and standard deviation in achievements, to check whether there is an association between the overall performance and the variability in the results. The figure shows that, as in the case of mathematics, the standard deviation in Lebanon is higher than what could be predicted given the average achievements considering the average of all the participating countries and territories. This shows significant disparities within Lebanon when it comes to performance in reading.

Figure 3.8 Variation against reading performance



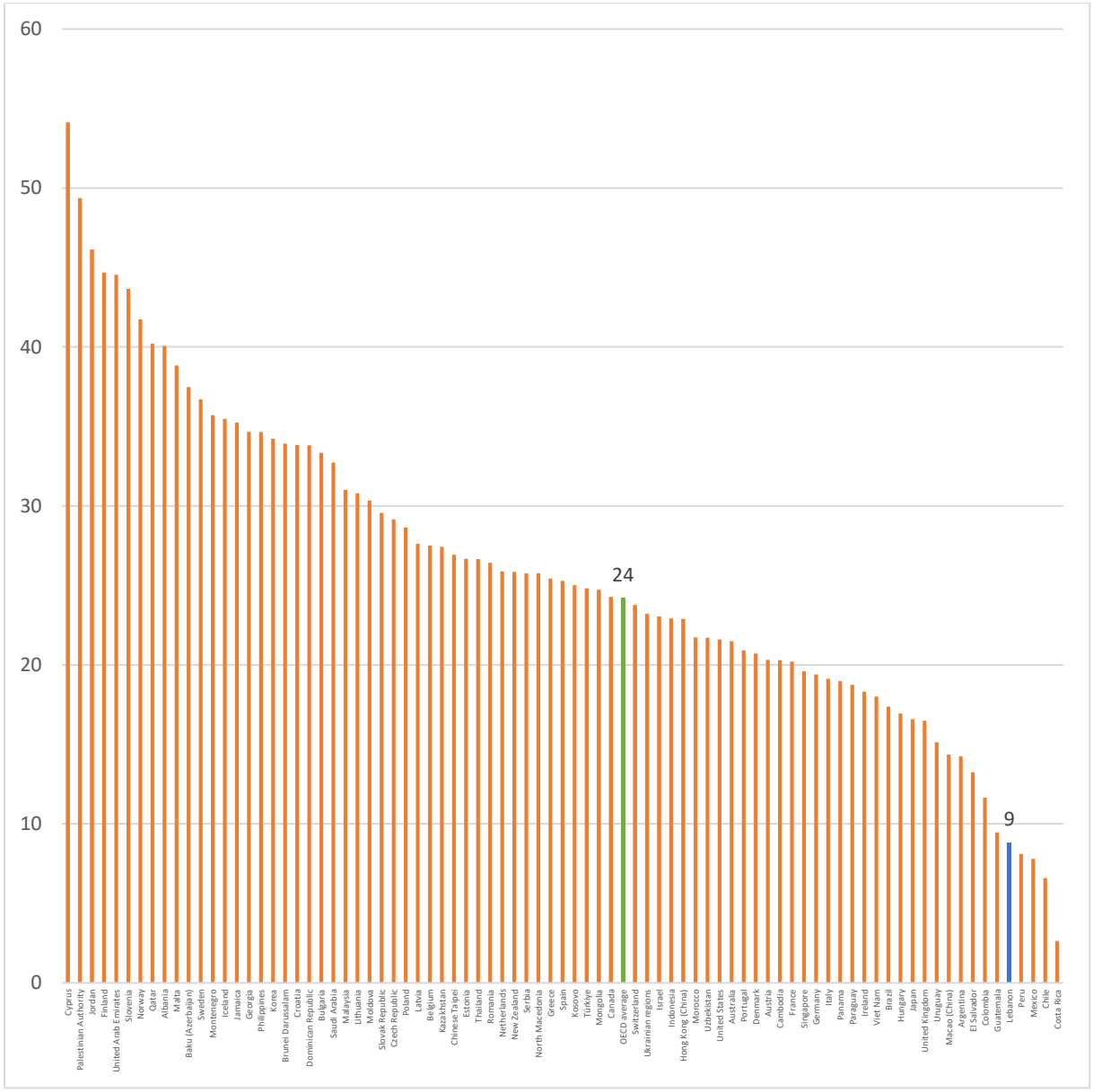
Source: OECD (2023a), Table I.B1.2.2

GENDER GAPS IN READING ACHIEVEMENTS

Gender gaps serve as a crucial point for analysis, as they show the possible existing disparities in opportunities offered to male and female students. Additionally, these gaps can offer insights into whether male or female students may require more support in their learning, influenced by varying attitudes or preferences that contribute to the existence of gender gaps. In this section, we will examine gender gaps in reading performance within PISA 2022, both in overall performance and across PISA proficiency levels. Unless explicitly stated otherwise, the gender gap is calculated as the difference between male and female scores, signifying the comparative advantage of males over females or, if negative, indicating a lower performance level among males.

Figure 4.9 presents the gender gap in reading achievements. In of the participating countries and economies, females perform higher than males in reading, with the largest gap being found in Cyprus (54 points) and the lowest gap being found in Costa Rica (3 points). In Lebanon, the gap is equal to 9 points, and therefore smaller than the one found on the OECD average, which equals 24 points. As in the case of mathematics, this may indicate a more equal performance for male and female students, who therefore do not experience significant gender-related challenges, but it can also indicate an overall challenging environment for both male and female students. This issue will be tackled below with the percentile comparison.

Figure 4.9. Gender gaps in reading achievement (females – males)

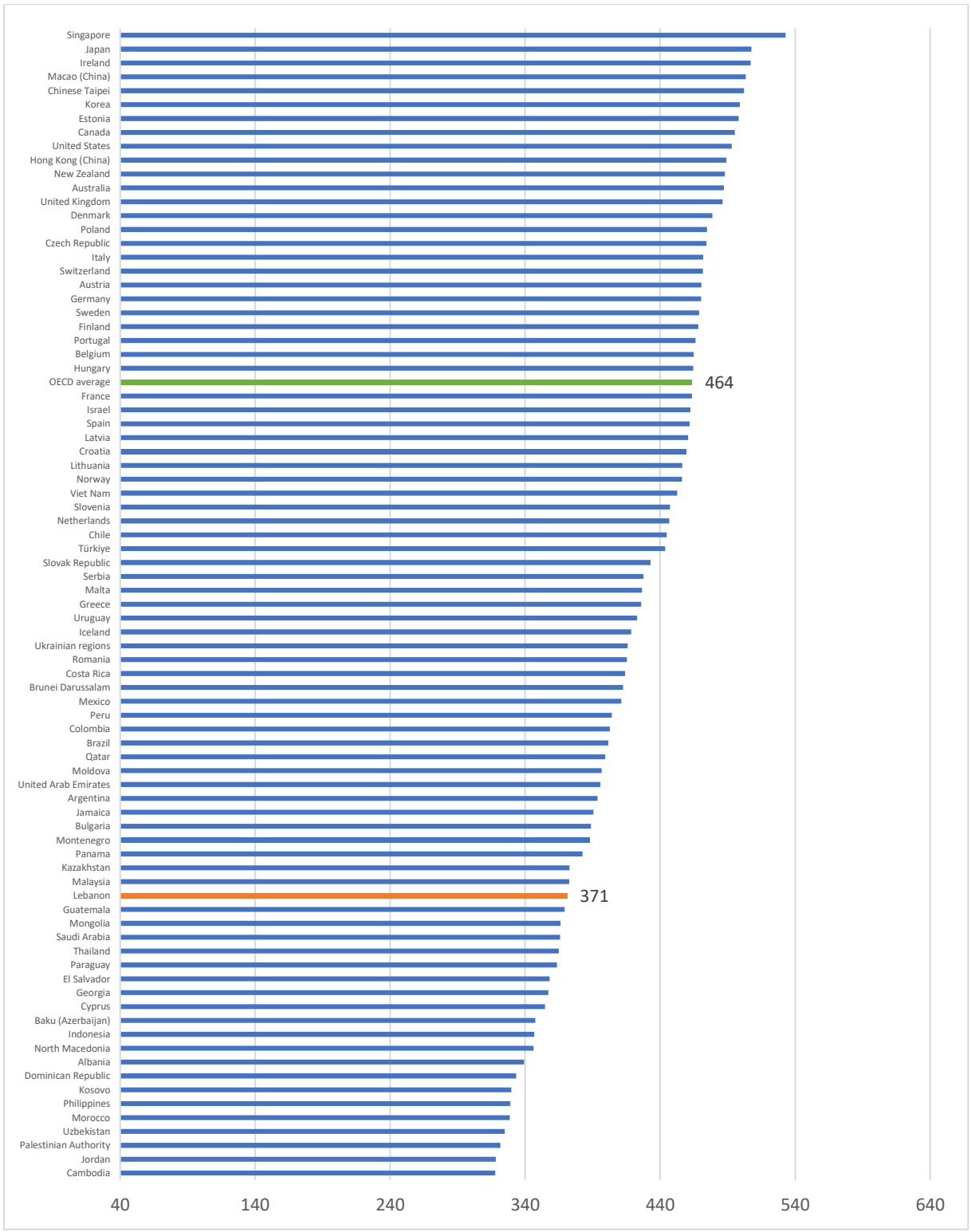


Source: OECD (2023a), Table I.B1.4.18

Figure 4.10 and Figure 4.11 present the average scores of male and female students, respectively, comparing the countries that took part in the 2022 PISA assessment. The results show that male students in Lebanon achieve on average 371 points in reading, compared to 464 points on OECD average. On the other hand, female students in Lebanon achieve on average 380

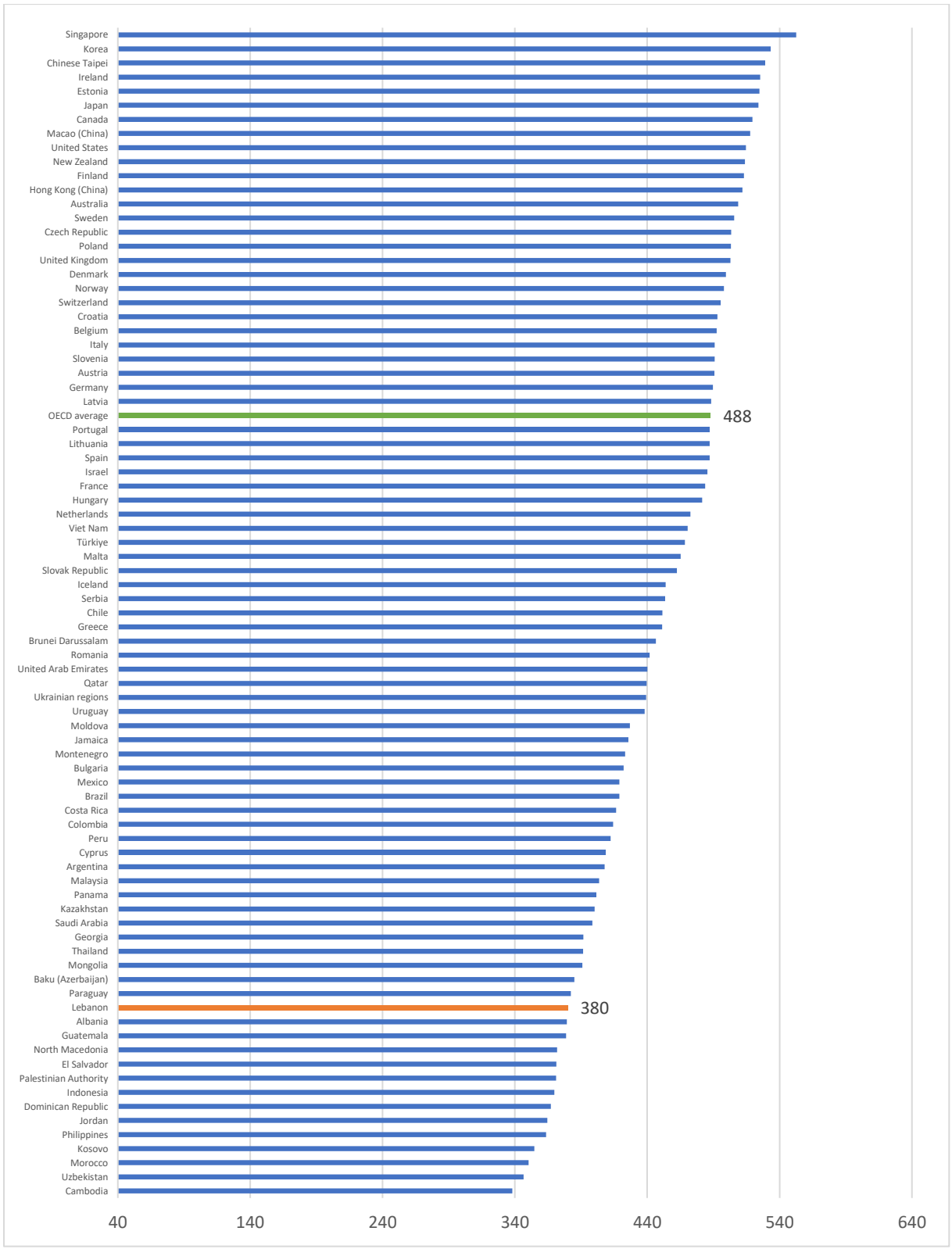
points in reading, compared to 488 points on the OECD average. These gaps, equal to 93 and 108 points respectively, indicate that both male and female students experience significant challenges and difficulties that lead them to perform significantly lower than the OECD average. Therefore, despite the small gender gap, it is crucial to intervene swiftly with measures aimed at improving the quality of the education provided to both male and female students in Lebanon.

Figure 4.10. Performance of male students in reading



Source: OECD (2023a), Table I.B1.4.18

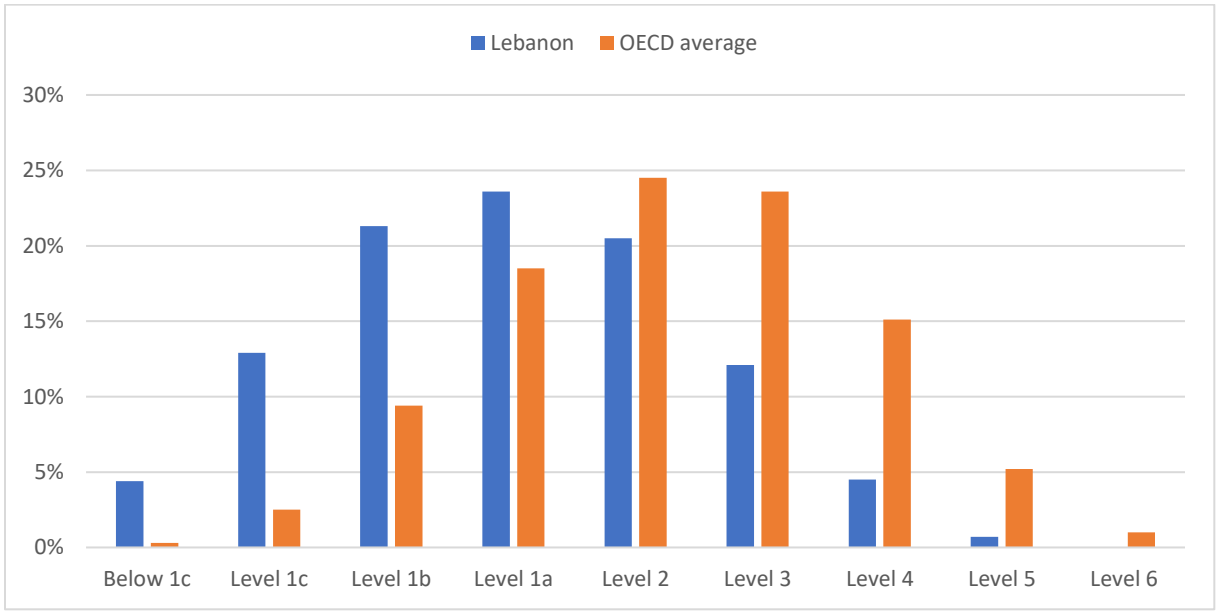
Figure 4.11. Performance of female students in reading



Source: OECD (2023a), Table I.B1.4.18

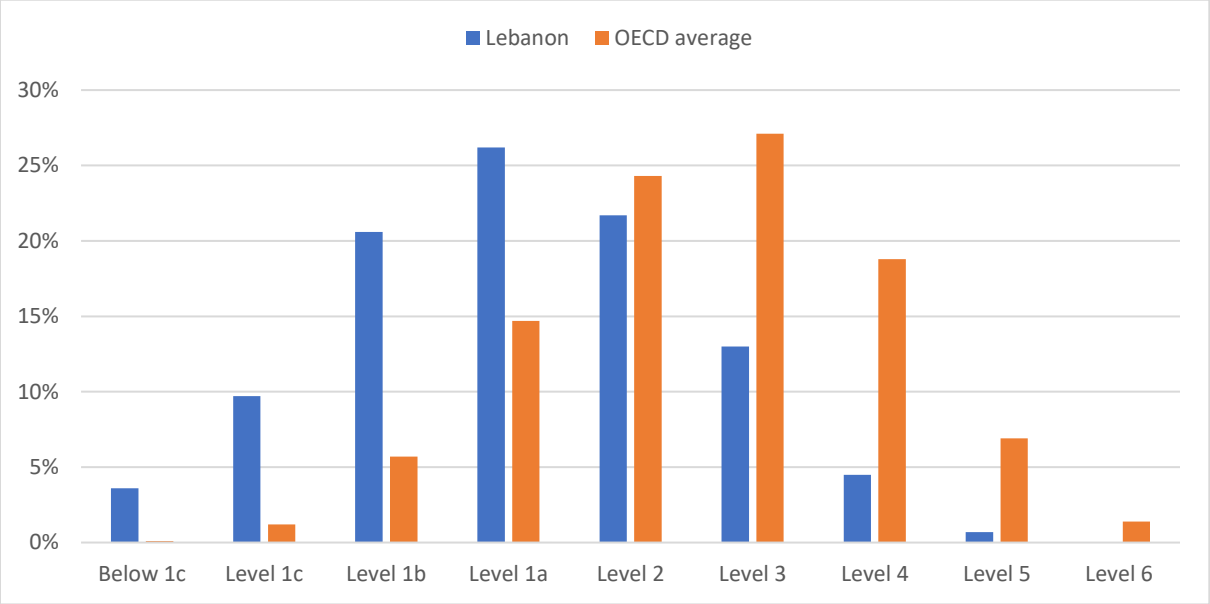
In the comparison of the gender gaps, it is also useful to look at the distribution of students at each proficiency level by gender. Figure 4.12 and Figure 4.13 compare these distributions for male and female students, respectively. The results show that both male and female students exhibit a distribution that is shifted to the left compared to the OECD average, but with no substantial differences between males and females within Lebanon. It can be seen how for both males and females few students manage to reach a very high levels of proficiency (5 or 6), while large shares reach levels below 1. On the OECD average, the modal proficiency level is 3 for female and 2 for males, which is reflected in the larger gender gap in favor of female students.

Figure 4.12. Percentage of male students at each reading proficiency level in Lebanon and OECD average



Source: OECD (2023a), Table I.B1.4.29

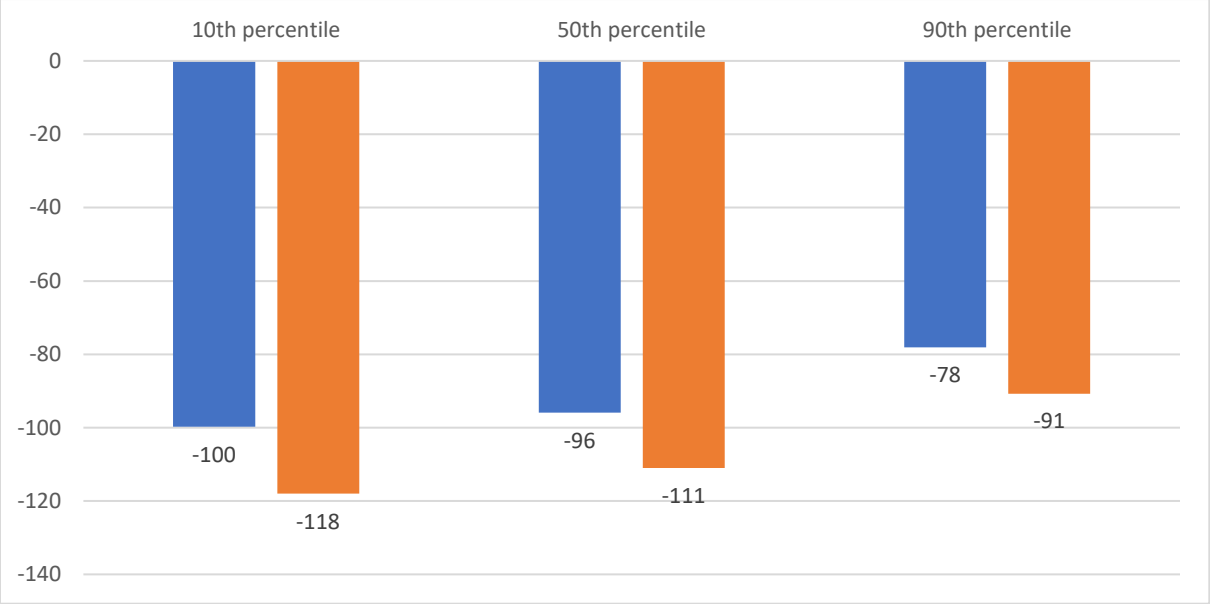
Figure 4.13. Percentage of female students at each reading proficiency level in Lebanon and OECD average



Source: OECD (2023a), Table I.B1.4.29

To achieve a more comprehensive comparison between the performance of male and female students, it is also useful to compare how they perform at different percentiles. Figure 4.14 shows the difference in average achievements of male and female students in Lebanon compared to the OECD average. The results show that, in line with the pooled data, the gap performance of both male and female students with the OECD average decreases as the percentile increases. The performance of males shows a decrease in the gap of 22 points between the 10th and the 90th percentile, while the performance of females shows a decrease of 27 points. These estimations further confirm how both male and female students are in urgent need of support to improve their performance, given that no significant gender effects are seen in the performance of Lebanese students.

Figure 4.14. Comparison of reading performance of Lebanese students against the OECD average



Source: OECD (2023a), Table I.B1.4.18

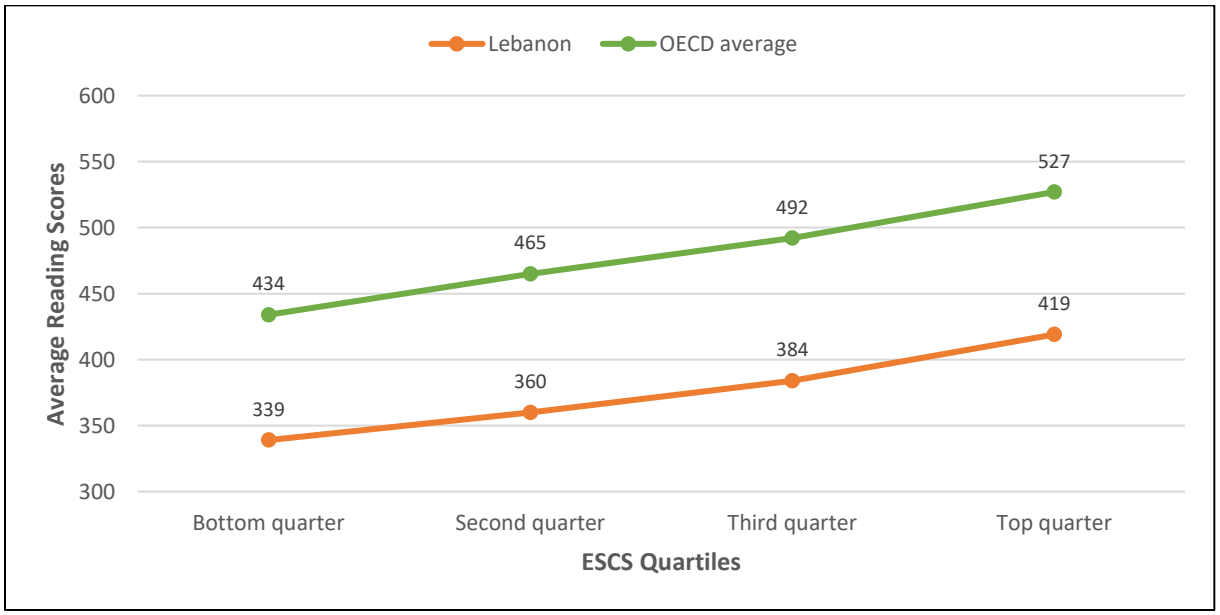
SOCIAL AND ECONOMIC CONTEXTS OF READING PERFORMANCE

Socioeconomic status stands out as a crucial variable in understanding disparities in students' achievements. Given that more affluent students typically have better access to supportive educational tools, it can be anticipated that they will achieve higher results. In the era of distance learning and the pandemic, the impact of socioeconomic status has become more apparent than ever. The most disadvantaged students may lack access to optimal tools for distance learning, potentially resulting in academic setbacks compared to their more affluent counterparts. Additionally, private schools may have been better equipped at the onset of the pandemic, while public schools might not only lack proper tools for distance learning but also face challenges related to teachers' skill gaps in this context.

Figure 4.15 shows the average reading performance against the average Economic, Social, and Cultural Status (ESCS) index defined by the PISA framework. The results indicate that in Lebanon students from the bottom quarter of the ESCS scale achieve on average 339 points in reading (95 points less than the OECD average), 360 and 384 points if they are from the second and third quarters, respectively (with gaps with the OECD average being equal to 105 and 108

points, respectively), and 419 points if they are from the top quarter (with a gap of 108 points with the OECD average). As with mathematics, this indicates how students from more disadvantaged backgrounds encounter significant challenges in schools, but also how more affluent students are not able to fully exploit their advantage compared to the OECD average, given how the gaps are increasing as the ESCS quarter increases.

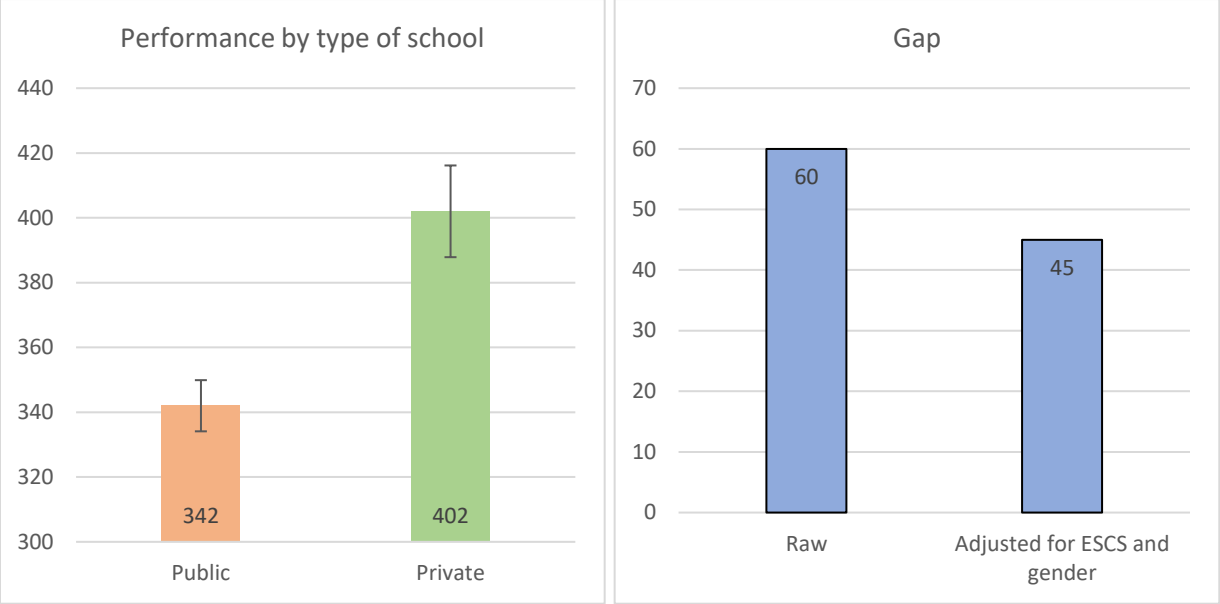
Figure 4.15. Reading performance and socioeconomic background



Source: OECD (2023a), Table I.B1.4.4

Another relevant indicator of how economic factors may influence performance is comparing the reading achievements of students from public and private schools. Figure 4.16 shows how students from private schools have a higher performance than students from public schools (402 points against 342 points). The gap is statistically significant, and importantly it remains so even after controlling for ESCS and gender (although it decreases in magnitude from 60 to 45 points). This shows how educational quality may be significantly higher in private schools, as a result of factors such as better learning resources provided to students and the retention of more experienced teachers.

Figure 4.16. Reading performance gap between students in public and private schools



Source: own estimations based on PISA 2022 data

As with mathematics, comparing students classified by the PISA framework as with and without a growth mindset can provide insights into how one's views on the possibility of changing one's intelligence may affect scores also in reading. Figure 4.17 shows the average scores of students with and without a growth mindset, and compares the gaps observed. As in mathematics, students that disagree with the question that intelligence is something that cannot be changed very much achieve on average 391 points, compared to 366 points of students who instead agree with the statement. The gap, equal to 25 points, is statistically significant and it remains so even after controlling for ESCS and gender (albeit decreasing to 20 points). This indicates how growth mindset is something that can help the performance of students also in reading, and should therefore be encouraged in schools and for the most disadvantaged students.

Figure 4.17. Reading performance gap between students with and without a growth mindset

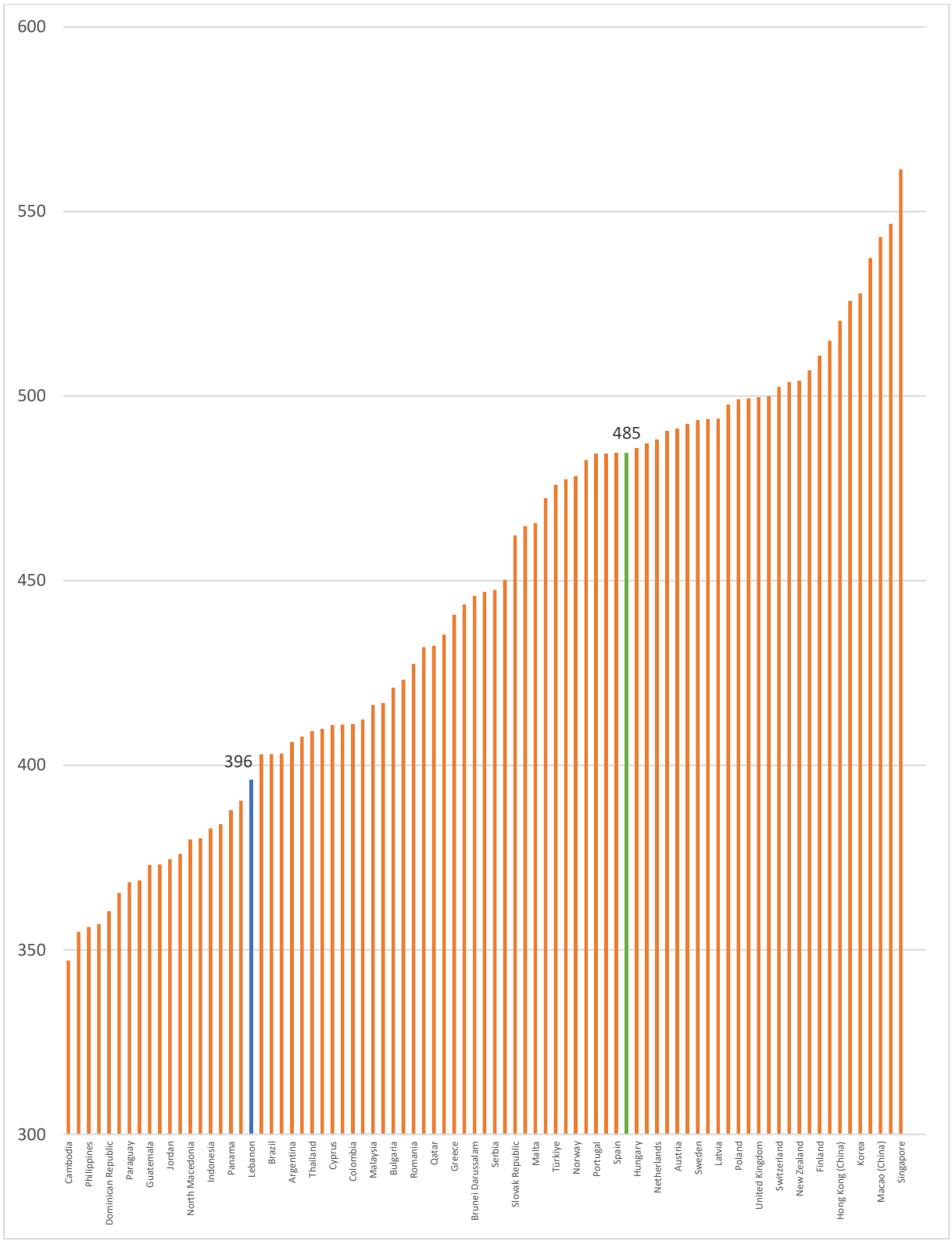
Source: own estimations based on PISA 2022 data

Chapter 5. Science performance of students in Lebanon

OVERVIEW OF THE RESULTS

In Lebanon, students achieve on average 396 points in the PISA scale, which is 89 points below the OECD average of 485 points. Due to this, Lebanon ranks in 64th position among the countries and territories participating in PISA. For an international comparison, the countries and territories whose performance was within 50 points of the average of Lebanon, thus being within half a standard deviation of the PISA assessment, were Guatemala, El Salvador, Jordan, Albania, North Macedonia, Baku (Azerbaijan), Indonesia, Georgia, Panama, and Saudi Arabia below Lebanon's average performance; and Jamaica, Brazil, Montenegro, Argentina, Peru, Thailand, Mexico, Cyprus, Costa Rica, Colombia, Mongolia, Malaysia, Moldova, and Bulgaria whose performance is above the average of Lebanon. In science, the countries with the highest average scores are Singapore (561 points), Japan (547 points), and Macao (China) (543 points); conversely, the countries with the lowest scores are the Philippines (356 points), Uzbekistan (355 points), and Cambodia (347 points).

Figure 5.1. Average performance in science in PISA 2022



Source: OECD (2023a), Table I.B1.2.3

Within the PISA framework, proficiency levels are a measure of how a student can effectively apply their knowledge in science. In particular, proficiency level 2 represents the minimum requirements for an individual to function and perform effectively in society and in the labor market. For this reason, it is of significant importance to assess the proportion of students reaching this particular proficiency level, in addition to comparing the distribution across all other levels. Figure 5.2 provides a comparative analysis of the proportions of students at each proficiency level in science in Lebanon, compared with the OECD average.

Figure 5.2. Students at science proficiency levels in Lebanon and on the OECD average

	Lebanon	OECD average	Percentage point difference
Below level 1b	9,6%	1,1%	8,5%
Level 1b	17,5%	6,3%	11,2%
Level 1a	27,4%	17,1%	10,3%
Level 2	26,2%	25,2%	1,0%
Level 3	14,5%	25,7%	-11,2%
Level 4	4,2%	17,2%	-13,0%
Level 5	0,6%	6,3%	-5,7%
Level 6	0,0%	1,2%	-1,2%

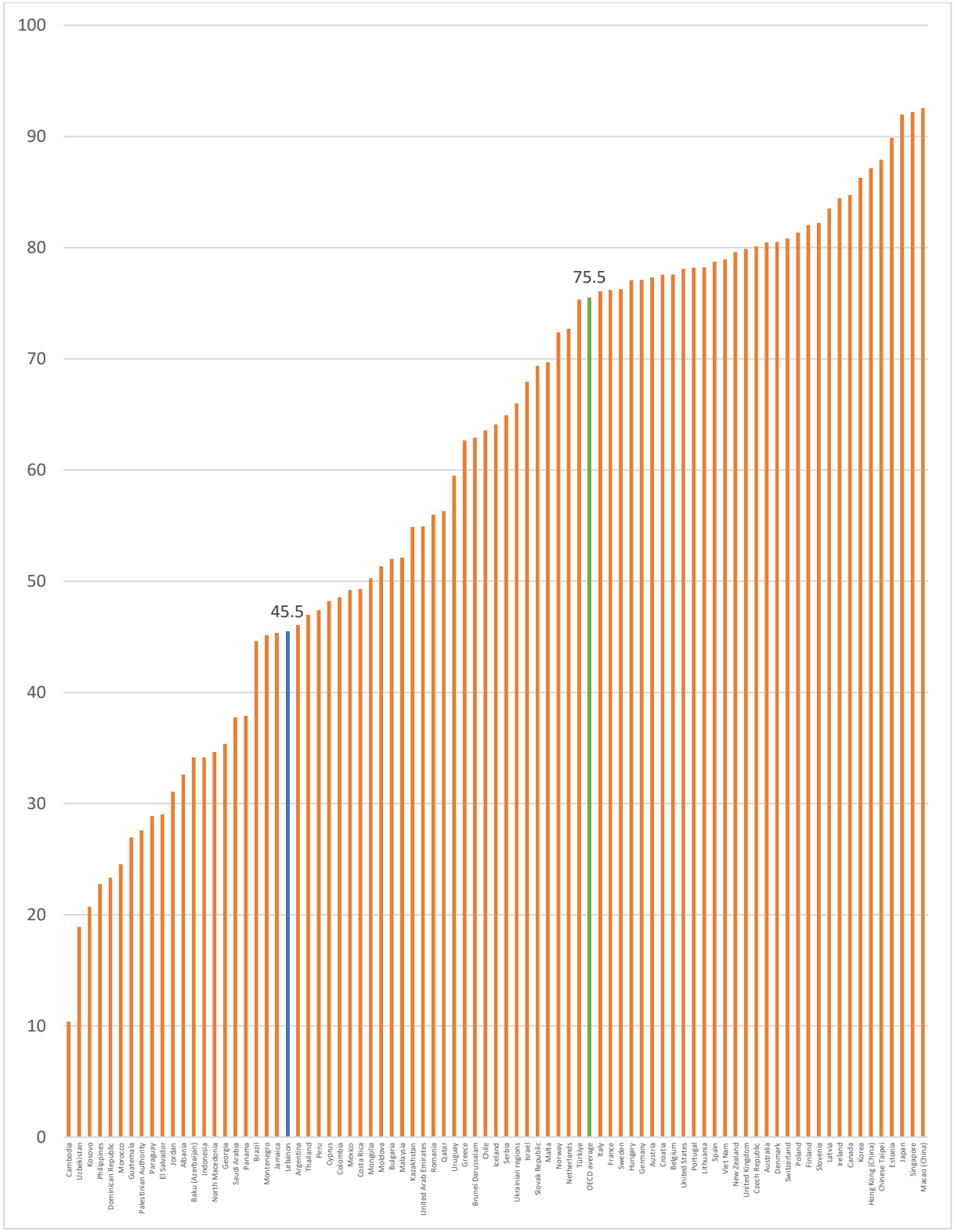
Source: OECD (2023a), Table I.B1.3.3

The figure indicates how, similar to mathematics and reading, students in Lebanon are found mostly at lower proficiency levels compared to the OECD average. This is visible by the positive gaps found until proficiency level 2, and the negative ones observed afterwards. Only 0.6% of students manage to reach high proficiency levels (5 or 6), compared to 7.5% of students on the OECD average. Conversely, 54.5% of students in Lebanon do not manage to reach proficiency level 2, compared to 24.5% on the OECD average. This is a further indication that students in Lebanon are in urgent need of support to improve their performance, also in the domain of science.

Figure 5.3 presents the shares of students at proficiency level 2 in the countries and territories participating in the PISA 2022. The countries that present the highest shares are Macao (China) (92.6%), Singapore (92.2%), and Japan (92.0%); conversely, the countries with the lowest

ones are Kosovo (20.7%), Uzbekistan (18.9%), and Cambodia (10.4%). Lebanon presents a share equal to 45.5%, which is 30 percentage points below the OECD average of 75.5%. This shows that only three fifth of the students that manage to reach proficiency level 2 on the OECD average manage to do so in Lebanon too. This confirms the difficulties experienced by students in the country, and thus the significant need for interventions and improvements.

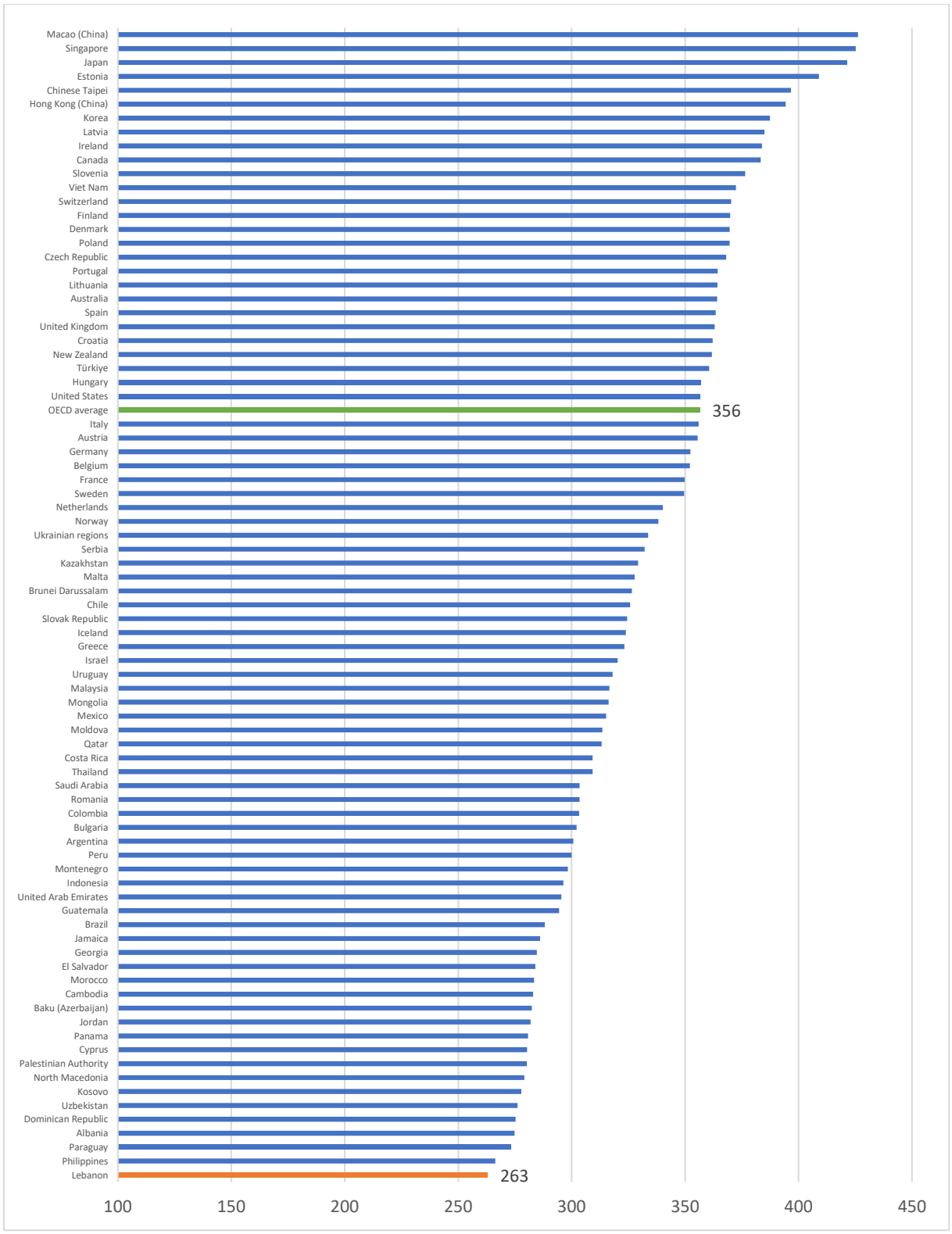
Figure 5.3. Students at proficiency level 2 or above in science



Source: OECD (2023a), Table I.B1.3.3

The comparison of the 10th percentile of results in science is a useful analysis to investigate how the lowest performing students compare between Lebanon and the OECD average. As low-achieving students encounter challenges that are related to their lower socioeconomic status, lack of home educational resources and lack of motivation, it is important to investigate how to improve the performance of students at the lower end of the score distribution. Figure 5.4 shows the results of the 10th percentiles of achievements in science.

Figure 5.4 Performance of low-achieving students in science (10th percentile of science)

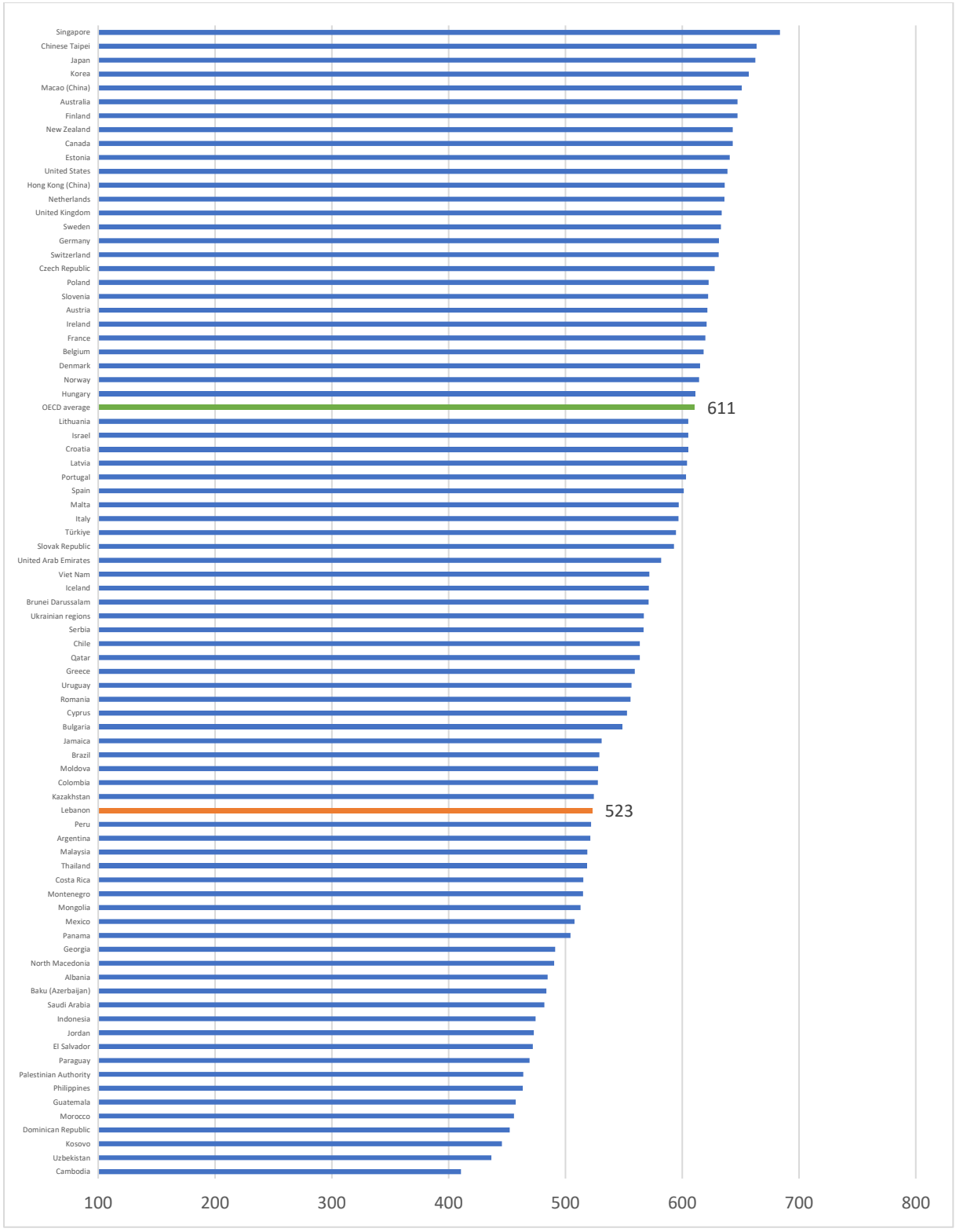


Source: OECD (2023a), Table I.B1.2.3

As in the case of reading, the average student performance in science of Lebanese pupils at the 10th percentile is the lowest among the countries and territories taking part in PISA, and it is equal to 263 points. The OECD average for this indicator is instead equal to 356 points, showing a 93 points difference. This exhibit confirms how the most underperforming students in Lebanon are in urgent need of support and interventions, given that they lag behind not only the OECD average but also all the countries participating in the PISA assessment. As this is true for both reading and science, measures should not be restricted to one single educational domain.

Conversely, it is also important to compare the 90th percentile of results in science. This comparison enables an evaluation of how countries rank when considering high-achieving students only. High-performing students may benefit from higher-quality educational resources, as well as higher motivation or support from teachers and parents. Thus, the examination of this particular subgroup of students allows to gather evidence allowing to extend their opportunities to all students. Figure 5.5 shows the results of the 90th percentiles of achievements in science, thus providing information about the performance of students at the higher end of the achievement scale.

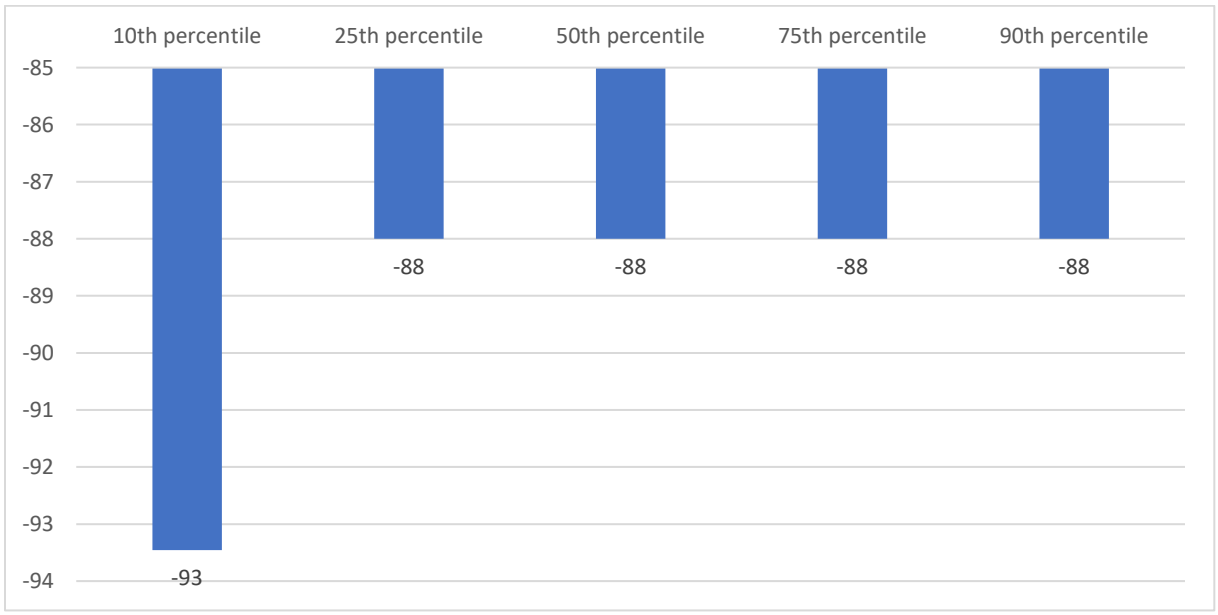
Figure 5.5. Performance of high-achieving students in science (90th percentile of science)



Source: OECD (2023a), Table I.B1.2.3

When considering the highest performing students only, Lebanon shows an average performance of 523 points, which is 88 points below the OECD average of 611. Numerically, the gap with the OECD average is similar to what was found when comparing students in the 10th percentile. A more detailed analysis of the distribution of the results in Lebanon is shown in Figure 5.6, which compares achievements gaps between students at 10th, 25th, 50th, 75th, and 90th percentiles between Lebanon and the OECD average. The results indicate that in the lowest percentile, the gap between Lebanese students and the OECD average equals 93 points, as noted above. In all the other percentiles, the gap is equal to 88 points. While similarly to mathematics and reading there is a tendency for the gap to diminish as the percentile increases, this trend in science is only visible when comparing the 10th percentile with all the others. The gaps between Lebanon and the OECD average remain constant for the 25th, 50th, 75th, and 90th percentiles.

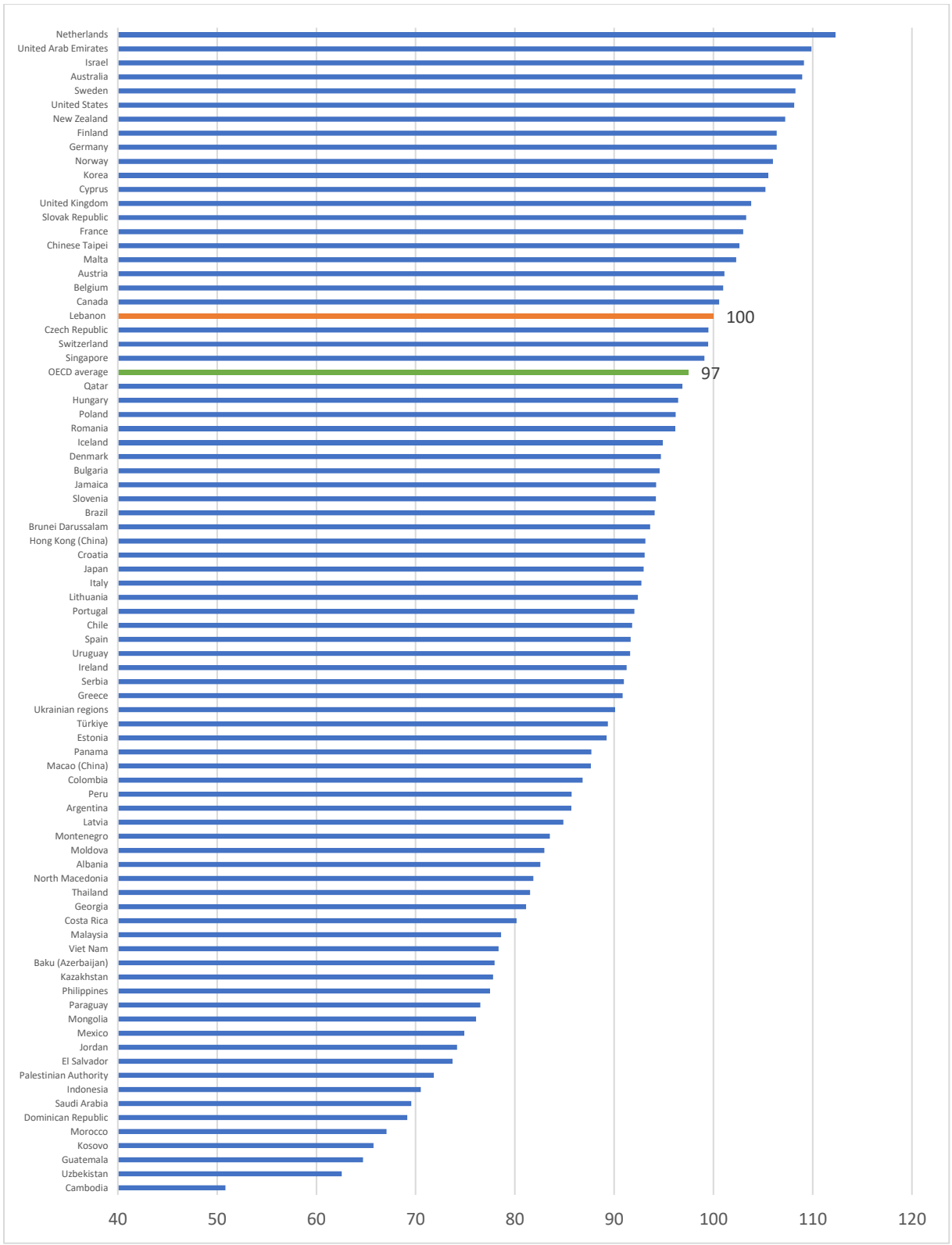
Figure 5.6. Comparison of performance of Lebanese students in science with the OECD average



Source: OECD (2023a), Table I.B1.2.3

The variation in science achievements can provide insights into the diversity of results obtained in the assessment, as higher values indicate a greater spread in the results. The PISA assessment includes information on the variance of a country's results, presented in the form of standard deviation. The assessment was structured to have an OECD average standard deviation set at the level of 100 points. Consequently, if the variance of results in a particular country or economy is above 100 points, it indicates a broader spread of results compared to the OECD average. Figure 5.7 visualizes the standard deviations of selected countries, providing a comparative view of the variability in their science assessment results.

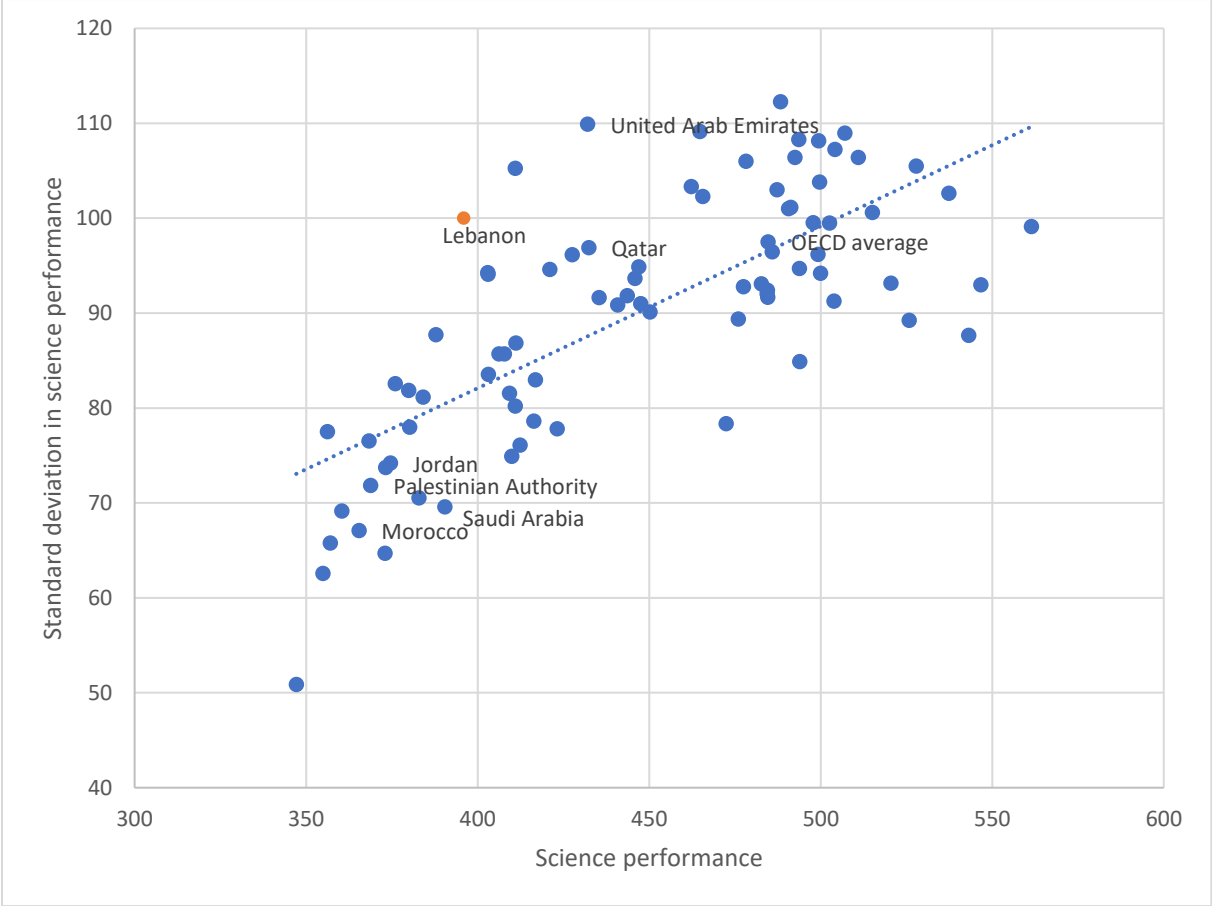
Figure 5.7 Variationin student performance in science



Source: OECD (2023a), Table I.B1.2.3

The results indicate that in Lebanon there is a standard deviation in science achievements equal to 100 points, while on the OECD average this value equals 97 points. Compared to mathematics and reading, the standard deviation is comparatively closer to the OECD average in science. Figure 5.8 presents the relationship between average science achievements and standard deviation in achievements, to check whether there is an association between the overall performance and the variability in the results. The figure shows that, as in the case of mathematics and reading, the variation in science performance is above the trendline for the participating countries and territories, indicating that in Lebanon there is a higher variation in performance than what could be predicted given the average performance itself. This is an additional confirmation of the existing significant inequalities among Lebanese students, also in the domain of science.

Figure 3.8 Variation against science performance



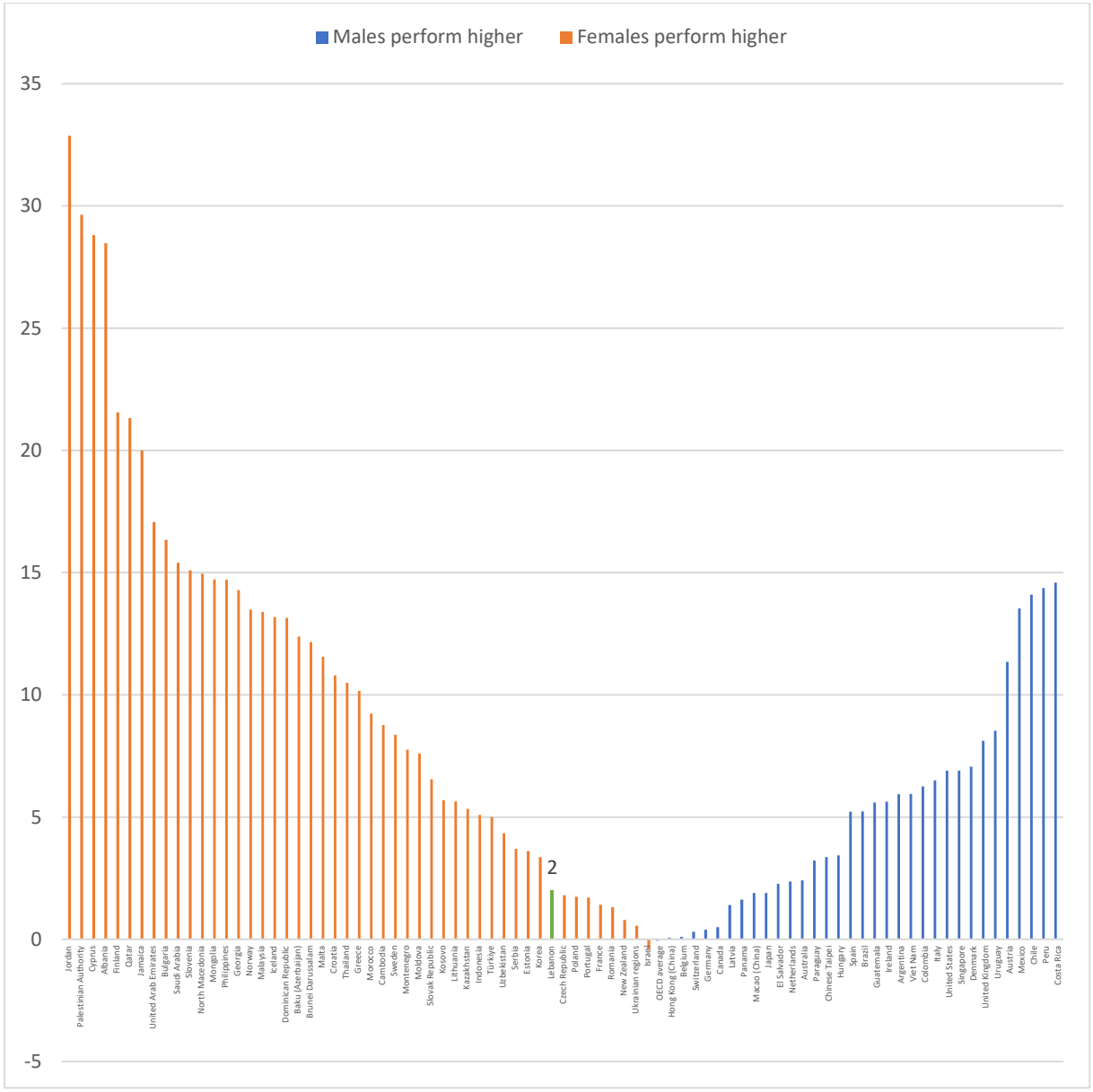
Source: OECD (2023a), Table I.B1.2.3

GENDER GAPS IN SCIENCE ACHIEVEMENTS

Analysing gender gaps is crucial, as they highlight potential disparities in the opportunities provided to male and female students. Furthermore, these disparities can provide valuable insights into whether male or female students may benefit from additional support in their learning, influenced by varying attitudes or preferences contributing to the presence of gender gaps. In this section, we will explore gender gaps in science performance within PISA 2022, examining both overall performance and variations across PISA proficiency levels. Unless explicitly mentioned otherwise, the gender gap is computed as the distinction between male and female scores, indicating the comparative advantage of males over females or, if negative, suggesting a lower performance level among males.

Figure 5.9 presents the gender gap in science achievements. In the majority of countries, males perform higher than females in science, with the largest gap in Costa Rica (15 points) among the countries where males perform higher than females, and the largest gap in Jordan (33 points) among the countries where females perform higher than males. In Lebanon, females show a higher performance than males by 2 points. On the OECD average, the gap is equal to zero points, thus showing that Lebanon does not differ significantly from the OECD average in this particular indicator.

Figure 5.9. Gender gaps in science achievement (males – females)

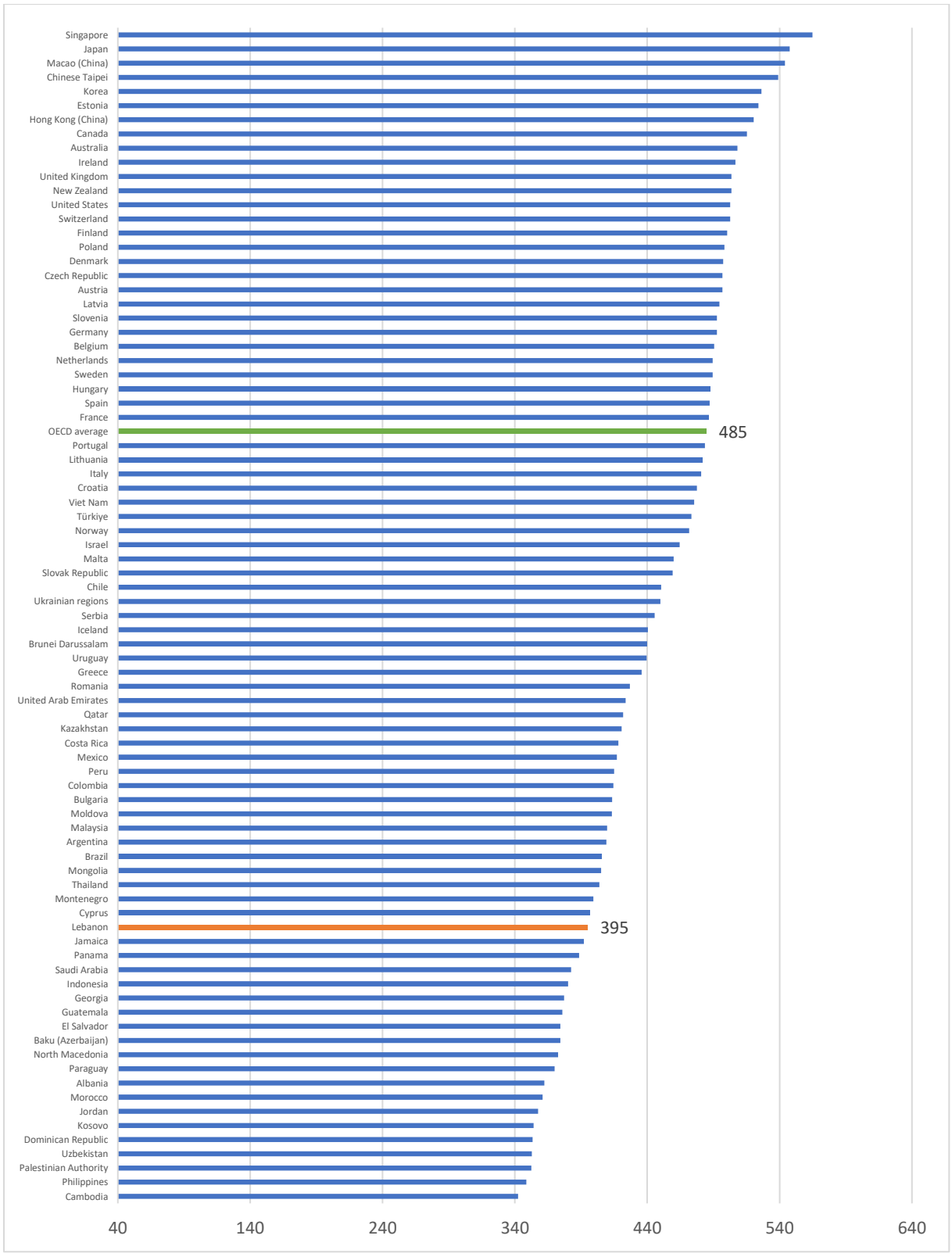


Source: OECD (2023a), Table I.B1.4.19

Figure 5.10 and Figure 5.11 present the average scores of male and female students, respectively, comparing the countries that took part in the 2022 PISA assessment. The results show that the average performance of male students in Lebanon equals 395 points, while the performance of female students equals 397 points. In both cases, the OECD average equals 485

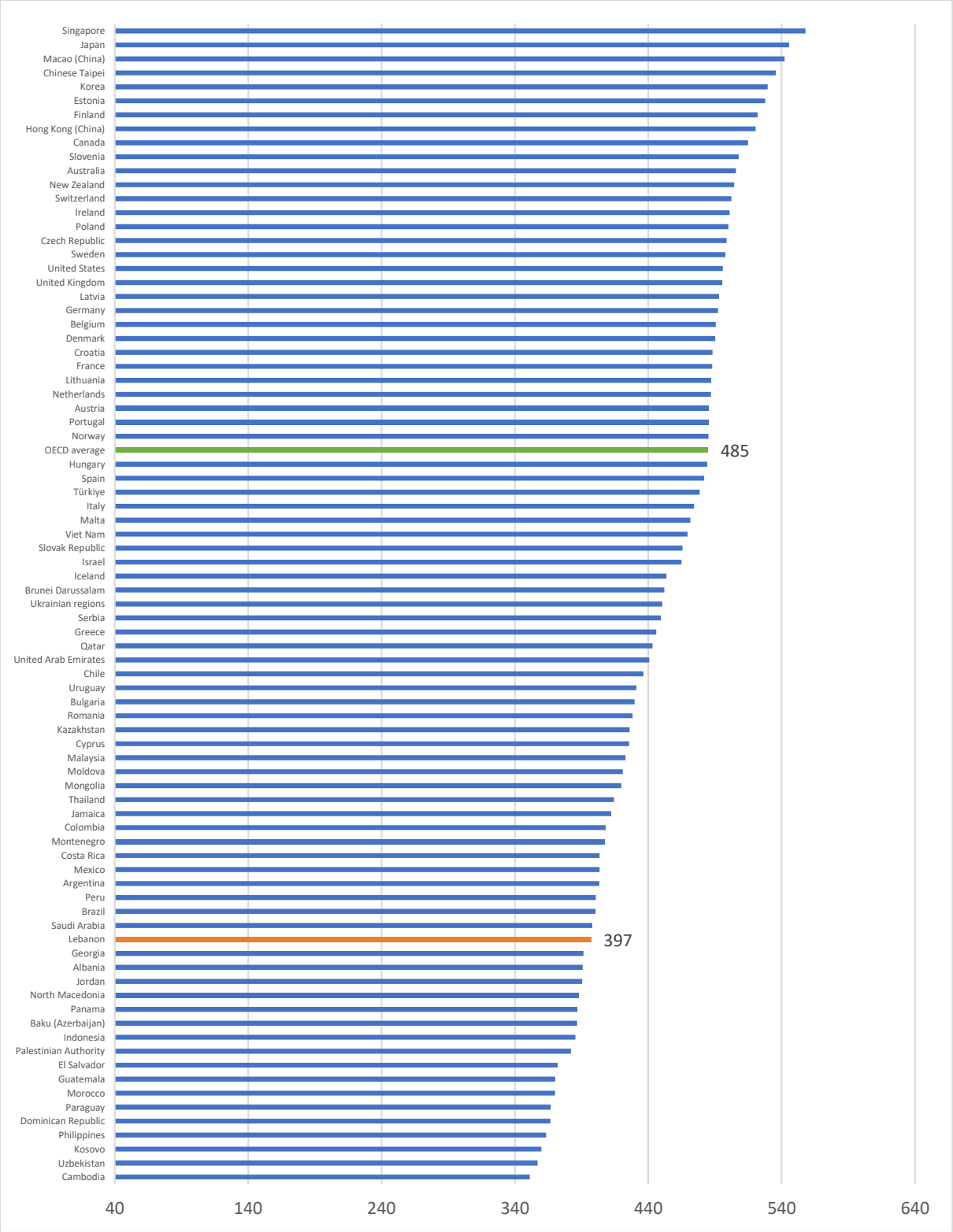
points, thus the country lags 90 and 88 points behind it when considering male and female students, respectively. As in the case of reading and mathematics, this shows how all students in Lebanon need supportive measures and improvements in the quality of education provided to them, irrespective of their gender – in fact, the gaps are small, indicating that no significant gender effects are visible when considering science performance.

Figure 5.10. Performance of male students in science



Source: OECD (2023a), Table I.B1.4.19

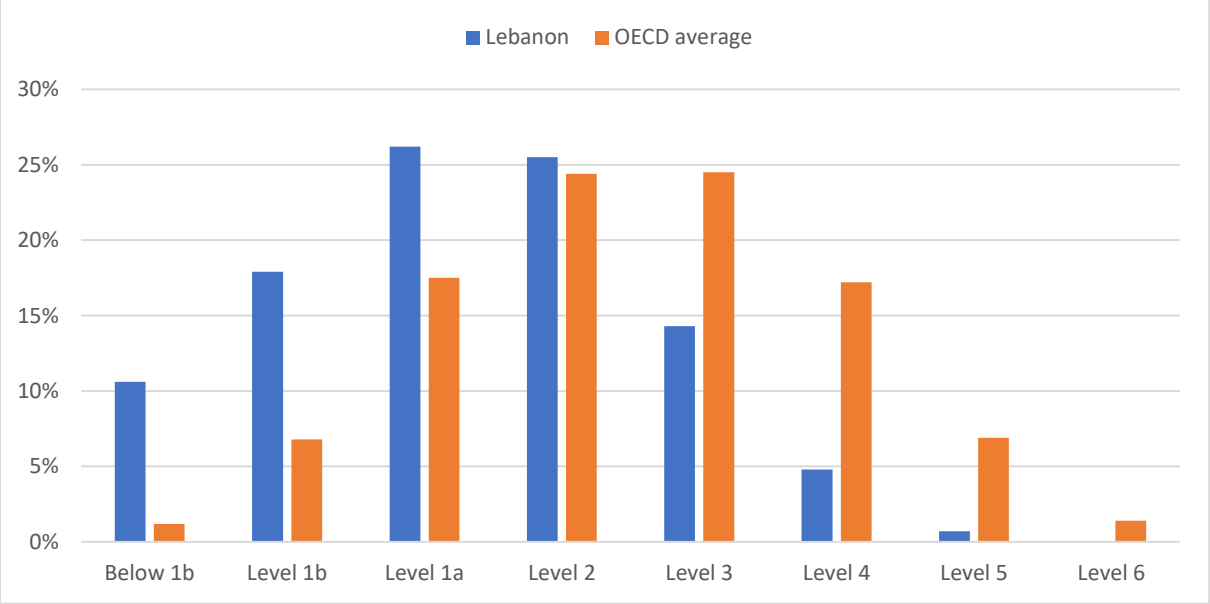
Figure 5.11. Performance of female students in science



Source: OECD (2023a), Table I.B1.4.19

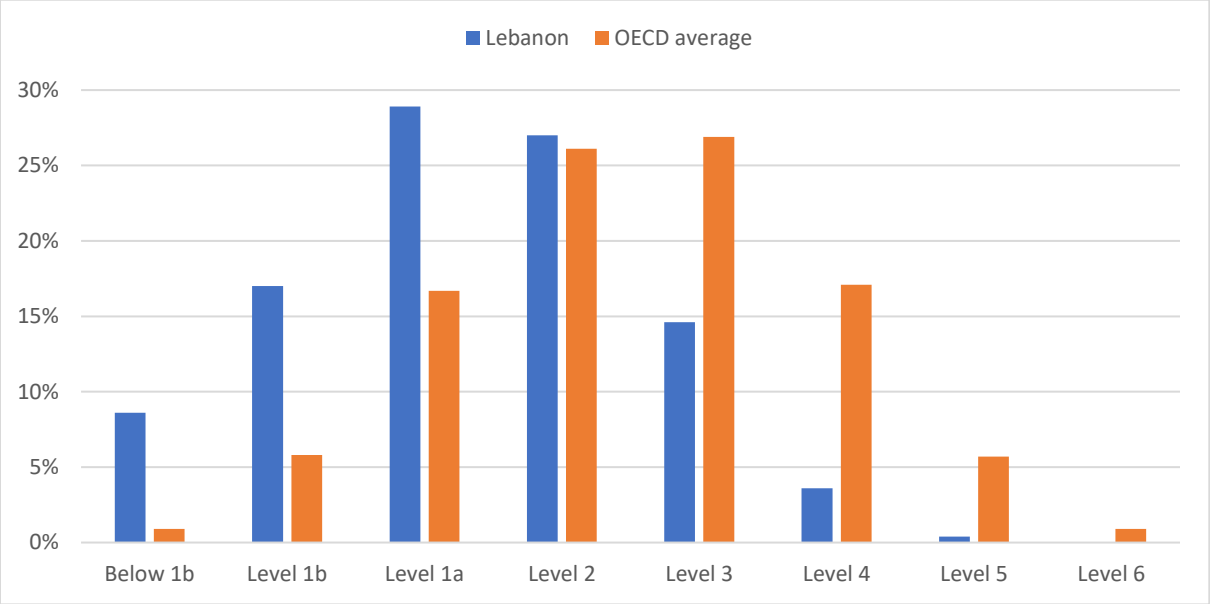
As in previous chapters, it is also important to compare the distribution of students across proficiency levels in science. Figure 5.12 and Figure 5.13 compare these distributions for male and female students, respectively. The results show that, similar to mathematics and reading, no substantial gender gaps are observed in the distribution of students in Lebanon when comparing males and females in science proficiency levels. However, it is important to stress how also in science the distributions – both of males and females – are shifted to the left of the ones of the OECD average, showing how less students are found at high or very high proficiency levels, and more students are found at the low proficiency levels.

Figure 5.12. Percentage of male students at each science proficiency level in Lebanon and OECD average



Source: OECD (2023a), Table I.B1.4.30

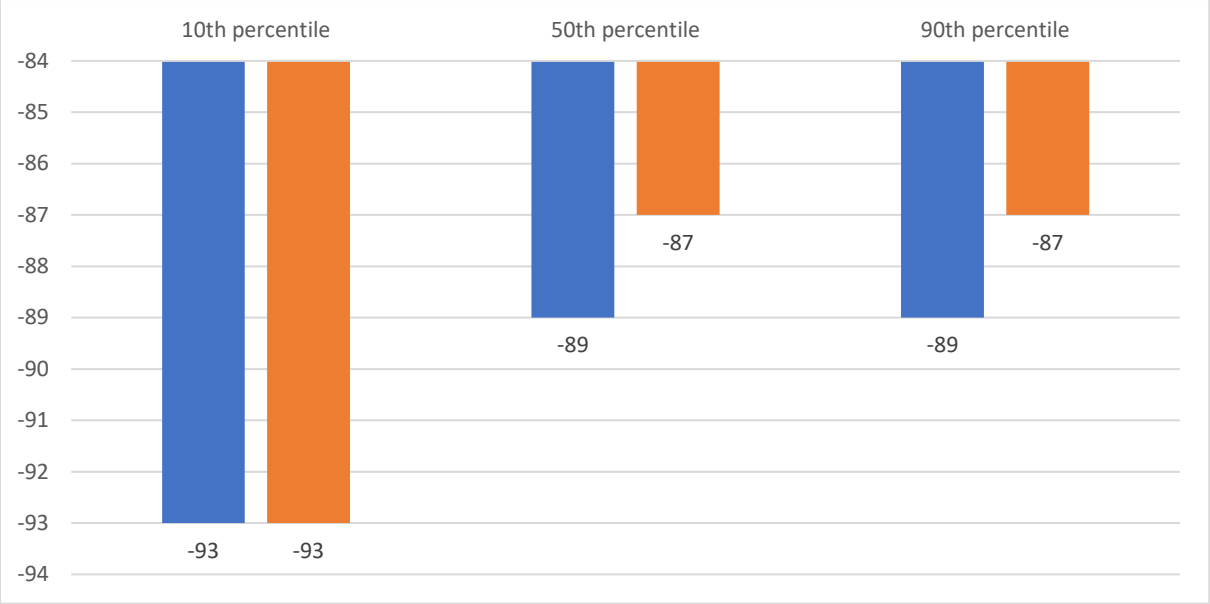
Figure 5.13. Percentage of female students at each science proficiency level in Lebanon and OECD average



Source: OECD (2023a), Table I.B1.4.30

Comparing the performance of male and female students can be also done in terms of performance at different percentiles by gender. Figure 5.14 shows the difference in average achievements of male and female students in Lebanon compared to the OECD average. The results show that, similarly to the pooled data, the gaps between the performance of (male and female) Lebanese students after the 10th percentile remain constant. Yet, the largest gap is still found when considering students at the 10th percentile itself. This confirms how, irrespective of student gender, the lowest performing pupils are the ones that show the largest gaps with the OECD average, and are thus the most in need of interventions and support to improve their performance.

Figure 5.14. Comparison of science performance of Lebanese students against the OECD average



Source: OECD (2023a), Table I.B1.4.19

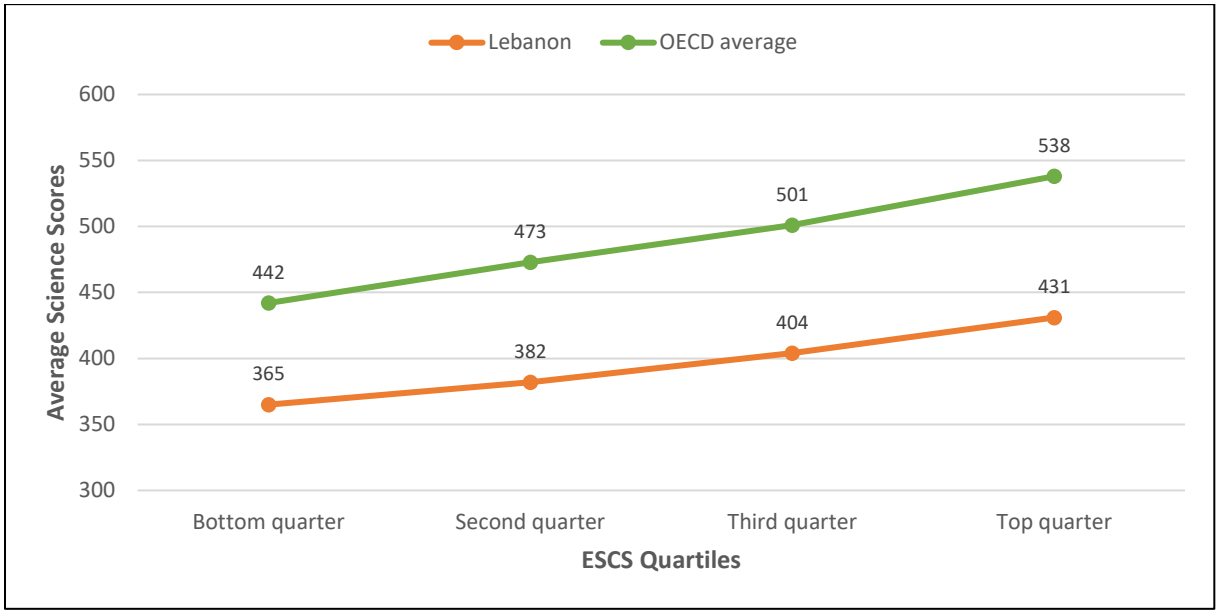
SOCIAL AND ECONOMIC CONTEXTS OF SCIENCE PERFORMANCE

Socioeconomic status stands out as a crucial variable in understanding disparities in students' achievements. Given that more affluent students typically have better access to supportive educational tools, it can be anticipated that they will achieve higher results. In the era of distance learning and the pandemic, the impact of socioeconomic status has become more apparent than ever. The most disadvantaged students may lack access to optimal tools for distance learning, potentially resulting in academic setbacks compared to their more affluent counterparts. Additionally, private schools may have been better equipped at the onset of the pandemic, while public schools might not only lack proper tools for distance learning but also face challenges related to teachers' skill gaps in this context.

Figure 5.15 shows the average science performance against the average Economic, Social, and Cultural Status (ESCS) index defined by the PISA framework. The results show how the performance of students in Lebanon in the bottom, second, third, and top quarters of the ESCS index equal 365, 382, 404, and 431, respectively. The gaps with the OECD average equal 77, 91, 97, and 101 points, respectively. As in mathematics and reading, these results suggest that in

addition of socioeconomic background being associated with higher scores in science as well, students in Lebanon suffer from additional difficulties compared to the OECD average, given that the gap increases as the ESCS quarter increases.

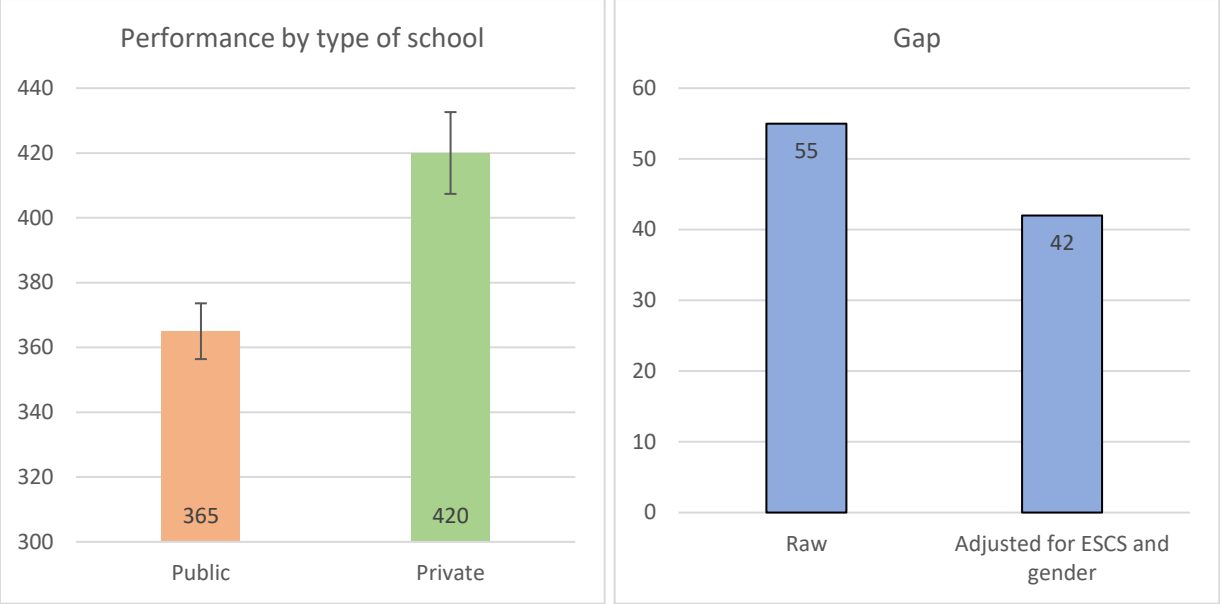
Figure 5.15. Science performance and socioeconomic background



Source: OECD (2023a), Table I.B1.4.5

Comparing the science achievements of students from public and private schools can also be another interesting analysis of the effect of social and economic factors on scores. Figure 5.16 shows that students from private schools have a higher performance than students from public schools (420 points against 365 points). The gap is statistically significant as in mathematics and reading, and it remains so after controlling for ESCS and gender, yet it decreases in magnitude from 55 to 42 points). As with previous domains, this shows that private schools may be able to provide a higher educational quality thanks to more advanced learning resources provided to students.

Figure 5.16. Science performance gap between students in public and private schools



Source: own estimations based on PISA 2022 data

As with mathematics and reading, it is also possible to compare students with and without a growth mindset, giving insights into how this may affect science scores. Figure 5.17 shows the average scores of students with and without a growth mindset, and compares the gaps observed. As in mathematics and reading, students that disagree with the question that intelligence is something that cannot be changed very much achieve more points: on average 407, compared to 389 for those students who instead agree with the question. The gap is equal to 18 points and is statistically significant; moreover, it remains significant after controlling for ESCS and gender decreasing to 14 points.

Figure 5.17. Science performance gap between students with and without a growth mindset

Source: own estimations based on PISA 2022 data

These results indicate how growth mind-set may provide a strong support for the performance of students in all the domains surveyed by PISA, and therefore it should be developed in students and especially in those schools where pupils struggle the most with learning.

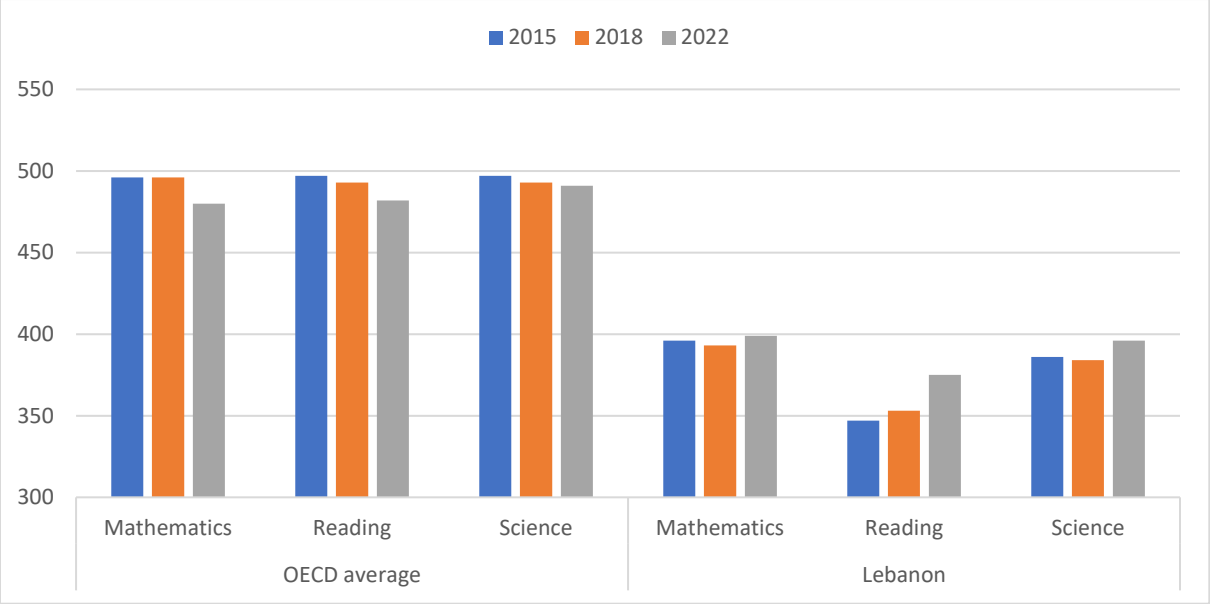
Chapter 6. Trends in student performance in Lebanon

TRENDS IN ACHIEVEMENTS 2015-2022

The participation of Lebanon in the 2022 PISA assessment allows to evaluate historical trends for the country over three assessments. Moreover, the fact that the time period between the 2018 and the 2022 assessments also included the pandemic also allows to compute a tentative measure of the learning loss caused by school closures. This chapter compares the evidence for Lebanon in 2018 and 2022 in terms of overall achievements, proficiency levels, and gender gaps, comparing the country to the OECD average.

Table 6.1 presents the achievements found on the OECD average (refers to the Arithmetic mean across all OECD Member countries, excluding Austria, Chile, Colombia, Estonia, Israel, Lithuania, Luxembourg, the Netherlands, the Slovak Republic, Slovenia, Spain, Turkey, the United Kingdom and the United States) and in Lebanon between 2015 and 2022, comparing mathematics, reading, and science scores. While the OECD trends can also be compared including significance – and indeed a significant change was observed in mathematics and reading between 2018 and 2022, it is not possible to do the same with Lebanon. For this reason, the trends should be interpreted only as offering a general overview of the changes in performance, without information on the robustness of the observed gaps.

Figure 6.1. Trends in achievements between 2015 and 2022



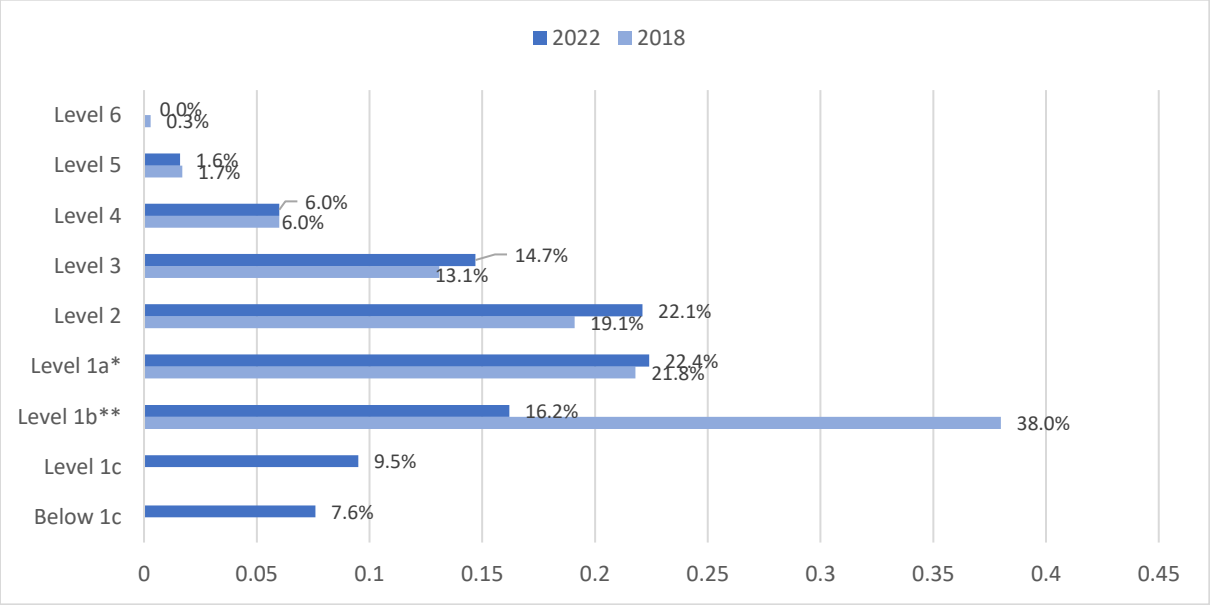
Source: PISA 2022 Database, Tables I.B1.1-I.B1.4 and I.B1.7.

The results indicate that while on the OECD average there has been an overall decrease in performance in all the domains (and in reading and science this decrease is observable also between 2015 and 2018), in Lebanon the trend is different. In mathematics, the average score has increased in 2022 compared to 2018, after a decrease between 2015 and 2018. A similar overall trend is visible in science. In reading, on the other hand, the trend has been of increasing scores since 2015, with a larger change between 2018 and 2022 than what was observed between 2015 and 2018. These trends, although not interpretable in terms of statistical significance, give a general indication that the overall educational performance of Lebanese students has been increasing since 2018, which is a remarkable outcome given the outbreak of the COVID-19 pandemic and the switch to remote learning over the same time period.

Figure 6.2, Figure 6.3, and Figure 6.4 present the changes in shares of students found at PISA proficiency level in mathematics, reading, and science respectively, comparing 2018 and 2022. The results indicate similar trends compared to the observations for the overall achievements. In particular, in all the domains surveyed by PISA it is possible to note an increase in the shares of students observed at the higher proficiency levels, compared to a decrease in the

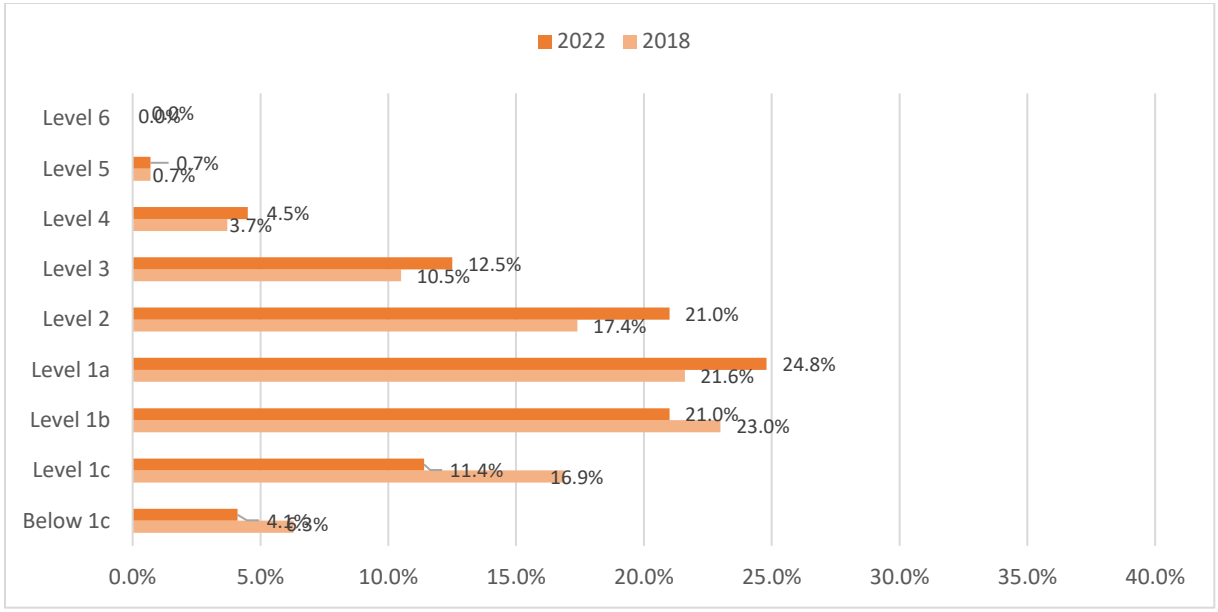
shares observed at the lower proficiency levels. It is especially worth mentioning how the shares of students found at or above level 2 have increased in all the domains between 2018 and 2022, indicating an improvement in the long-term opportunities that Lebanese students will be able to have in their life and in the labor market.

Figure 6.2. Students at mathematics proficiency level in 2018 and 2022 in Lebanon



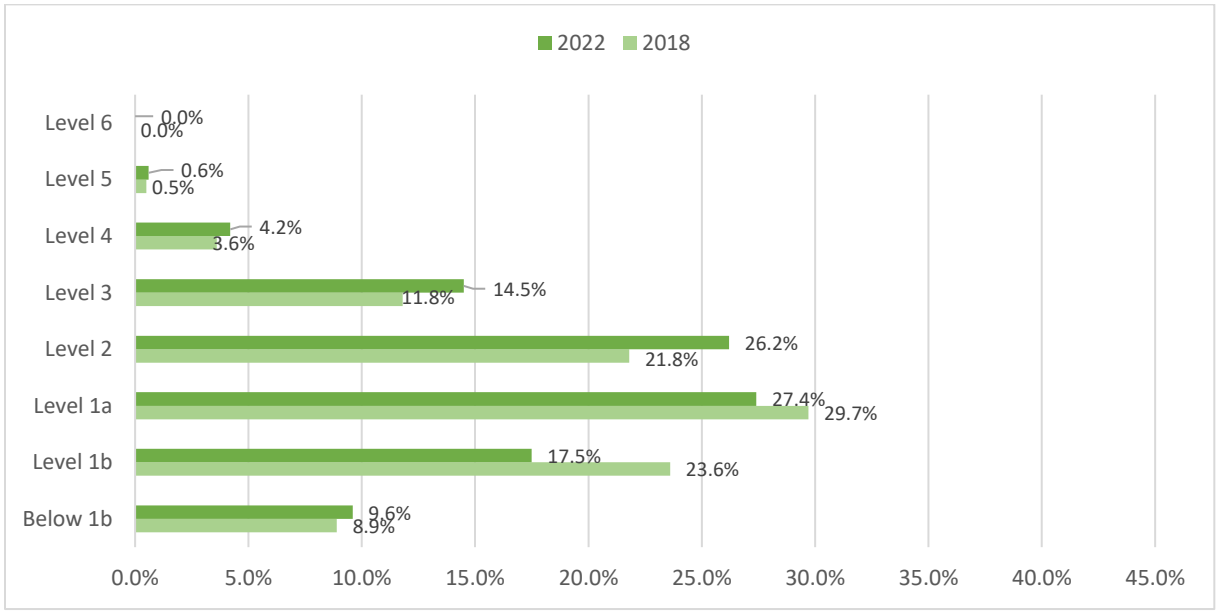
Source: own estimations based on PISA 2022 microdata

Figure 6.3. Students at reading proficiency level in 2018 and 2022 in Lebanon



Source: own estimations based on PISA 2022 microdata

Figure 6.4. Students at science proficiency level in 2018 and 2022 in Lebanon

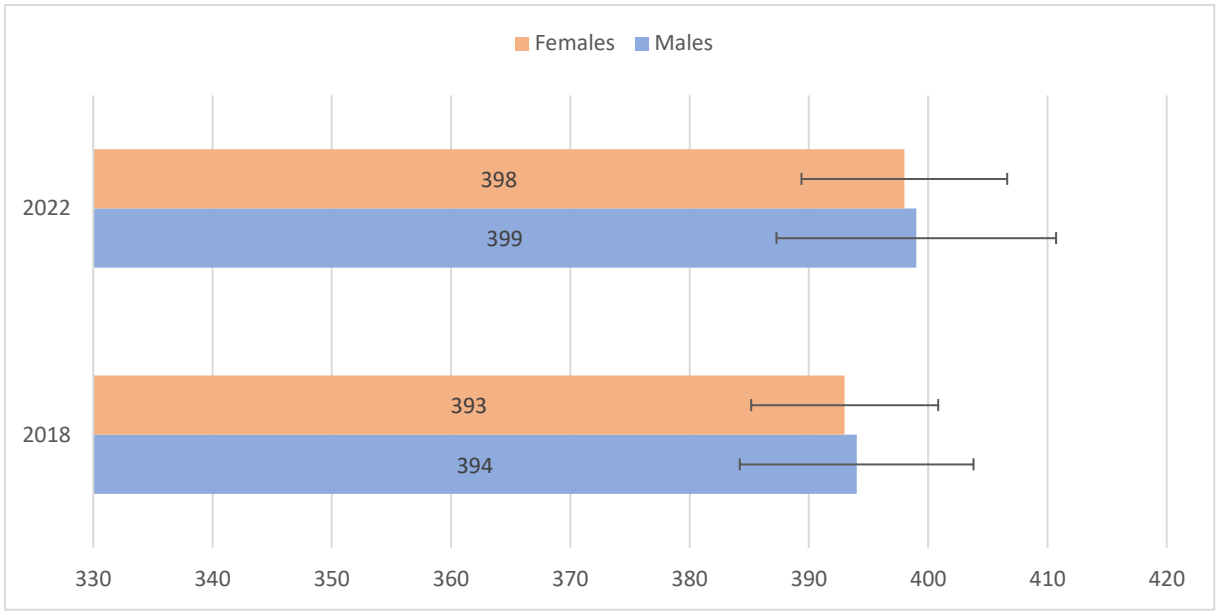


Source: own estimations based on PISA 2022 microdata

Figure 6.5, Figure 6.6, and Figure 6.7 present the trends in the performance of Lebanese students comparing the performance of male and female students. The results are in line with the ones of the pooled data, and do not show significant differences between the performance of male and female students. In mathematics, the gap has remained the same (1 point) with males performing higher, while the performance of both males and females has increase by 5 points on average. In science, the gap has decreased in magnitude from 5 to 2 points (with females performing higher), with the performance of female students increasing by 11 points and the performance of male students increasing by 14 points.

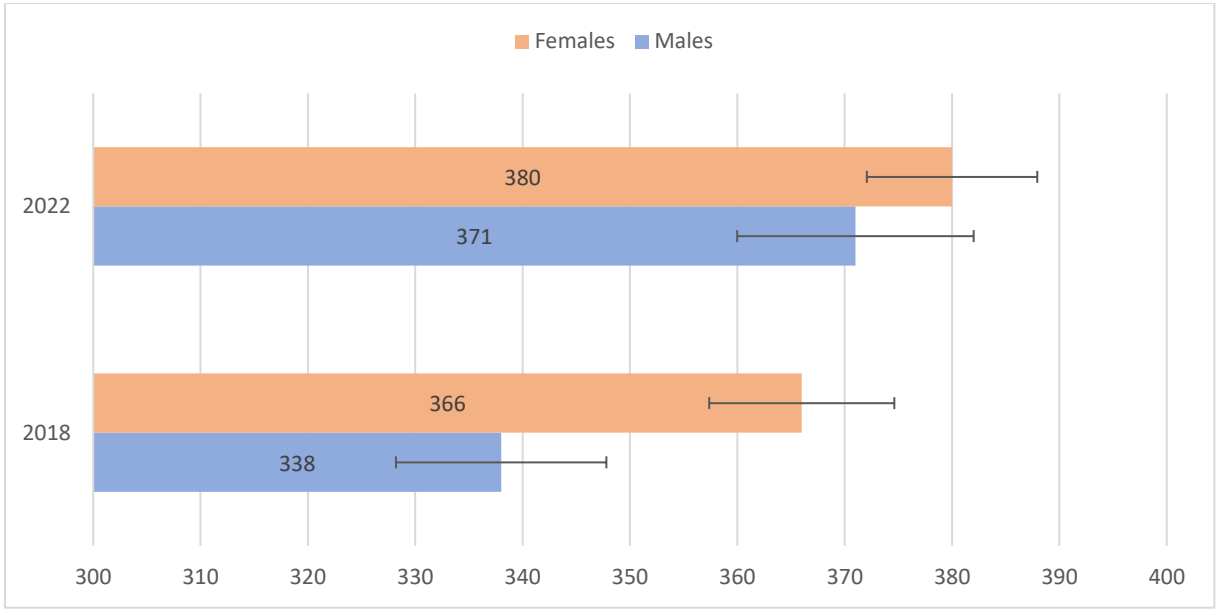
In reading, the gender gap has decreased from 28 to 9 points, mostly thanks to an improvement in the performance of males (who are performing lower): while the performance of female students has increased by 14 points on average, the performance of male students has increased by 33 points on average. Notably, the increase in the performance of male students in reading has increased significantly between 2018 and 2022 – as a result, the gender gap has lost statistical significance.

Figure 6.5. Performance in mathematics by gender, 2018 and 2022



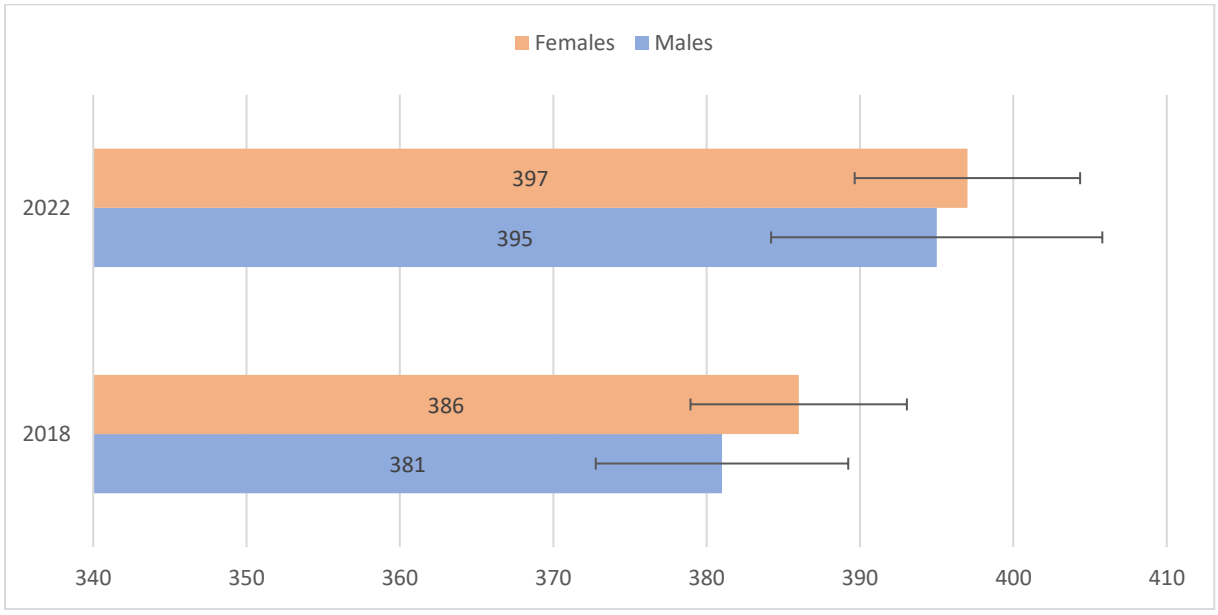
Source: own estimations based on PISA 2022 microdata

Figure 6.6. Performance in reading by gender, 2018 and 2022



Source: own estimations based on PISA 2022 microdata

Figure 6.7. Performance in science by gender, 2018 and 2022



Source: own estimations based on PISA 2022 microdata

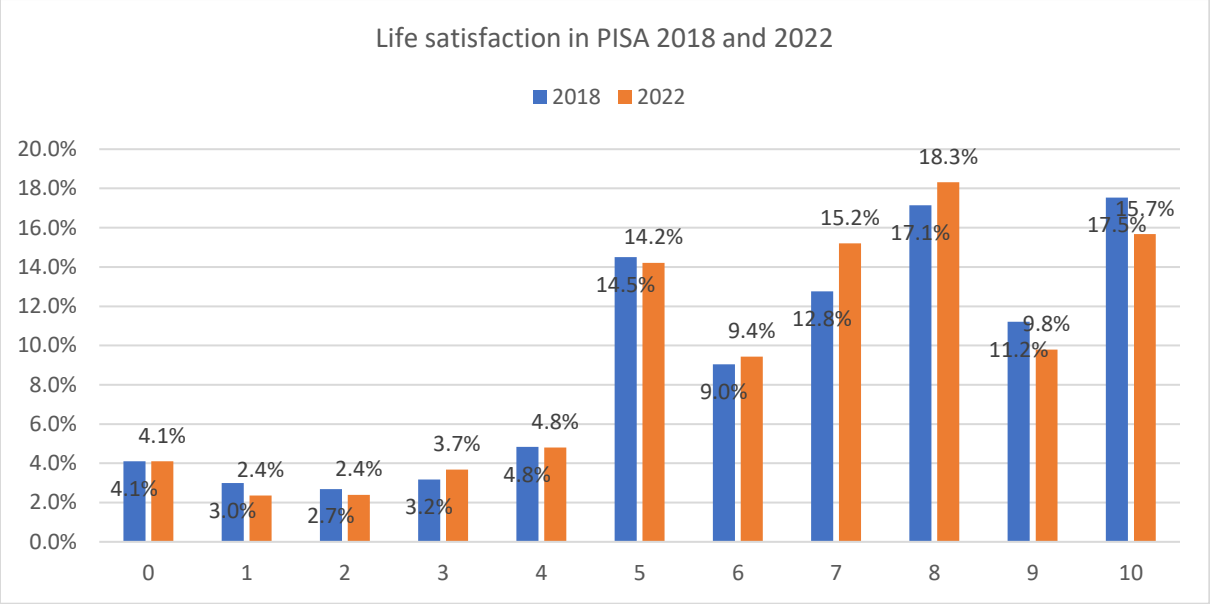
In general, even though comparison between 2018 and 2022 cannot be made rigorously and therefore with no guarantee of statistical significance, it is worth noting how the overall performance in all the domains surveyed by PISA has increased in Lebanon. This is reflected both in the average scores and in the percentages of students found at the different proficiency levels, and especially above proficiency level 2. Moreover, the gender gaps have remained the same or even decreased over the same time period, indicating how the performance of both male and female students has increased, thus without specific difficulties experienced by one of the genders.

IMPACT OF THE PANDEMIC ON STUDENT ACHIEVEMENT

PISA 2022 provides a unique opportunity to assess and compare the knowledge and skills of 15-year-olds before and after the pandemic. School closures were implemented in many countries during the pandemic, some lasting for several weeks. While most countries adopted online classes and support for students, the results from PISA 2022 indicate a significant decline in overall student performance over the last four years. It is crucial to emphasize that these changes in performance may not exclusively be attributed to the effects of school closures and the shift to online and digital teaching. The COVID-19 pandemic has had widespread impacts, causing economic, social, and psychological losses that could indirectly influence students' performance. Nonetheless, PISA data allow for comparisons between students in schools closed for varying durations, offering insights into the potential relationship between the length of school closures and the observed decline in performance.

Figure 6.8 provides evidence on students' life satisfaction, comparing estimations for 2018 and 2022 in Lebanon. In PISA, students are asked to rank their life satisfaction on a scale from 0 to 10, thus allowing to evaluate whether the estimations have changed significantly between before and after the COVID-19 pandemic (although it should be stressed that other factors may have contributed to the observed changes). The results show how no significant changes in the shares found at each level of life satisfaction are observed, thus indicating that Lebanese students do not experience significantly decreased levels of life satisfaction in 2022 compared to 2018.

Figure 6.8. Life satisfaction in Lebanon, 2018 and 2022



Source: own estimations based on PISA 2022 microdata

Table 6.1 shows an estimation of the learning loss based on the weeks of school closures. In particular, we computed the average per-week loss as the ratio between the loss in performance in the OECD countries and the average number of weeks of school closures. In OECD (2023b), the average number of months of schools' closures is computed as 4.4 – we transform it into a weekly measure by multiplying it by 4 (thus 4.4 x 4 = 17.8 weeks). Afterwards, we computed the corresponding loss for Lebanon, by multiplying the resulting number by the number of weeks of school closures in the country as reported by UNESCO. In Lebanon, schools were fully closed for 34 weeks and partially closed for 15 weeks. For the sake of our analysis, we only consider full closures, thus 34 weeks. We then computed the difference between the change in performance observed in Lebanon and the total loss computed assuming a per-week loss equal to the one for the OECD average.

Table 6.1. Computation of the change in scores given the pandemic, by months of school closures

	Mathematics	Reading	Science
Change in average performance observed on the OECD average[1]	-14.9	-10.7	-2.7
Per-week loss on the OECD average (computed as: change in performance / 17.6)	-0.85	-0.61	-0.15
Total expected loss in Lebanon predicting the same negative trend as in OECD countries (Per-week loss on the OECD average x 34)	-28.9	-20.7	-5.1
Change in performance observed in Lebanon	+6	+22	+12
Change in performance in Lebanon, assuming the total loss computed on a per-week basis	+34.9	+42.7	+17.1

Source: OECD (2023b), Table II.B1.2.2 and own calculations

Our preliminary results indicate that the change in performance observed in Lebanon could have been higher had not it been for the outbreak of the COVID-19 pandemic. In fact, given the loss observed on average in the OECD countries, and assuming a similar weighted loss in Lebanon, the changes in performance in Lebanon could have been predicted to be negative as well (namely, a loss of 28.9 points mathematics, 20.7 points in reading, and 5.1 points in science). Nonetheless, as the actual changes observed in Lebanon were positive for all the domains, this can indicate that the underlying actual changed could have been much larger in magnitude. While these estimations are entirely based on computations based on the OECD average (and are therefore not accounting for country-specific factors), they can still be used as preliminary evidence of the significant resilience of the Lebanese educational system to the pandemic, as well as the underlying improving performance of Lebanese students.

[1] Average across OECD countries, excluding Luxembourg, Spain and any countries where the violation of exclusion- and/or response-rate standards may have introduced bias in the sample in either 2018 or 2022.

Conclusions and policy recommendations

This report has focused on the performance of Lebanese students in PISA 2022, comparing the average scores in the country with the OECD average. The comprehensive analysis of the evidence from PISA 2022 with a focus on Lebanon has provided valuable insights into the state of education in the country. This concluding chapter synthesizes the key findings across the three domains of PISA, namely mathematics, reading, and science, and delves into various dimensions such as mean performance, gender gaps, socioeconomic determinants, social factors, and the influence of school clusters.

The results of the study demonstrate that Lebanon still lags significantly behind the OECD average in student performance across all three domains. In particular, the average scores of students are below the OECD average when considered together and also when the focus in on the lowest- or the highest-performing students. In fact, students in Lebanon also face significant struggles in reaching high proficiency levels. Moreover, the country shows significantly lower shares of students performing above proficiency level 2, which is the one that corresponds to the minimum requirements to participate in society successfully.

While gender gaps are significantly large, they still reveal a consistently low performance of Lebanese students compared to their OECD counterparts. Moreover, the examination of socioeconomic determinants indicates that more affluent students in Lebanon achieve comparatively higher scores, similar to the OECD average. However, it is noteworthy that even the most economically advantaged students still fall short of the OECD average in all domains, emphasizing the need for targeted interventions to bridge the performance gap.

Despite the challenging global situation and the disruptions caused by the COVID-19 pandemic, the trends in Lebanon between 2018 and 2022 reveal a positive trajectory. Notably, the data suggests an improvement in student performance during this period, reflecting the resilience and adaptability of the education system. This is visible in all the domains, both in terms of overall performance and of students reaching higher proficiency levels. However, it is crucial to acknowledge that our estimations show that the positive changes could have been more substantial if not for the adverse impact of the pandemic-induced learning loss.

The findings of this report highlight the urgency of addressing the disparities in student performance and elevating the overall quality of education in Lebanon. The improvements witnessed despite the pandemic show how the country has a high potential for positive changes with targeted interventions and strategic policy measures. To enhance educational outcomes, it is crucial for stakeholders to focus on targeted strategies addressing the identified challenges. These may include investments in teacher training, curriculum development, and interventions targeting socioeconomic disparities. Additionally, efforts should be directed towards mitigating the impact of pandemic-induced learning loss, ensuring a more resilient education system.

POLICY RECOMMENDATIONS

Based on the findings from this report, we formulate the following policy recommendations, aimed at improving the educational quality in Lebanon and provide students with more opportunities to succeed academically:

- Increase the quantity and quality of educational resources for disadvantaged students

Improving the educational landscape in Lebanon necessitates a targeted approach to address disparities in resource allocation, especially for the most disadvantaged students. The importance of this policy recommendation lies in its potential to level the playing field, providing equal opportunities for learning and development. By allocating additional resources to schools and students facing socio-economic challenges, policymakers can ensure that every student has access to high-quality teaching materials, technology, and a conducive learning environment.

Implementation of this recommendation involves several strategies. First, policymakers could allocate additional funding to schools in economically deprived areas, ensuring that they have the necessary infrastructure, teaching materials, and qualified educators. Simultaneously, initiatives promoting community involvement and partnerships with NGOs can enhance the support system for disadvantaged students. By fostering collaboration between government bodies, communities, and non-profit organizations, Lebanon can create a sustainable and equitable educational system for everyone.

- Develop a growth mindset in students, strengthening curiosity and motivation

Cultivating a growth mindset among students is a crucial aspect of a positive learning environment. This recommendation recognizes the importance of not only developing knowledge but also having a mindset that encourages curiosity, resilience, and motivation. A growth mindset empowers students to embrace challenges and persist when facing difficulties.

Implementation can begin with targeted teacher training programs that emphasize strategies for promoting a growth mindset in the classroom. Introducing curriculum components that highlight the value of learning from mistakes and embracing challenges can also play a crucial role. Additionally, extracurricular activities, mentorship programs, and community engagement initiatives can provide students with diverse opportunities to develop and apply a growth mindset in real-world scenarios. Furthermore, to gain a more accurate understanding of students' mindsets, a comprehensive approach involving multiple indicators, observations, and context-specific assessments could be beneficial.

- Reduce disparities in educational quality and resource access

Addressing disparities within the country is imperative for building a robust and inclusive education system. This policy recommendation is based on the fact that equal access to educational resources and opportunities is fundamental to narrowing achievement gaps. Implementing this recommendation involves a systemic approach that tackles both regional and socio-economic disparities.

To reduce educational disparities, policymakers can implement targeted policies that allocate resources based on the specific needs of each region. This might involve incentivizing skilled educators to work in the less developed areas, providing additional funding for schools in these regions, and establishing mentorship programs to support both students and teachers. Furthermore, promoting digital literacy and providing technology access can bridge the urban-rural educational divide.

- Develop a precise and reliable measure of learning loss

Understanding the extent of learning loss is critical for designing effective interventions and support mechanisms for the most affected students. The importance of this policy recommendation lies in its ability to provide data-driven insights into the areas that require urgent attention. Implementing this recommendation involves the development and implementation of a robust assessment framework.

To achieve this, Lebanon can collaborate with educational researchers, assessment experts, and international organizations to design and implement standardized assessments that accurately measure learning loss. These assessments should be comprehensive, covering various subjects and grade levels, and should consider the diverse learning environments students experienced during the pandemic. Regular and timely administration of these assessments, together with a transparent reporting system, will enable policymakers to tailor interventions to address specific learning needs and allocate resources effectively.

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APPENDIX A

Table A1. Summary descriptions of the proficiency levels in reading

Level	Lower score limit	Characteristics of tasks
6	698	Tasks at this level necessitate readers to make detailed and precise inferences, comparisons, and contrasts. They demand a comprehensive understanding of one or more texts, often involving the integration of information from multiple sources. These tasks challenge readers with unfamiliar ideas, prominent competing information, and the generation of abstract categories for interpretations. Reflecting and evaluating tasks may require readers to hypothesize or critically evaluate complex texts on unfamiliar topics, considering multiple criteria or perspectives and applying sophisticated understandings beyond the text. Access and retrieve tasks at this level demand precision in analysis and a keen attention to inconspicuous details in the texts.
5	626	Tasks at this level involving information retrieval demand the reader to locate and organize deeply embedded information, inferring the relevance of details in the text. Reflective tasks go beyond requiring critical evaluation or hypothesis formulation, drawing on specialized knowledge. Both interpretative and reflective tasks necessitate a comprehensive understanding of a text, even when its content or form is unfamiliar. Throughout all aspects of reading, tasks at this level consistently involve grappling with concepts that contradict expectations.
4	533	Tasks at this level involve retrieving information by organizing embedded details. Some tasks require interpreting language nuances in a text section, considering the entire text. Other interpretive tasks involve understanding and applying categories in an unfamiliar context. Reflective tasks necessitate readers to use formal knowledge for hypothesizing or critically evaluating texts. Proficiency at this level demands an accurate understanding of long or complex texts, even when unfamiliar in content or form.
3	480	Tasks at this level entail the reader to locate and, in some cases, recognize relationships among several pieces of information meeting multiple conditions. Interpretative tasks necessitate integrating various text parts to identify the main idea, understand relationships, or interpret word meanings. Many features must be considered when comparing, contrasting, or categorizing. Challenges may include non-prominent information, competing details, and obstacles like contrary or negatively worded ideas. Reflective tasks may involve connections, comparisons, explanations, or evaluating text features. Some reflective

		tasks require a nuanced understanding of the text in relation to everyday knowledge, while others demand drawing on less common knowledge.
2	407	Tasks at this level may involve locating one or more pieces of information, requiring inference, and meeting various conditions. Other tasks include recognizing the main idea, understanding relationships, or interpreting meaning in a less prominent part of the text, necessitating low-level inferences. Tasks may also encompass comparisons or contrasts based on a single feature in the text. Reflective tasks typically ask readers to make comparisons or connections between the text and external knowledge, drawing on personal experiences and attitudes.
1a	335	Tasks at this level involve the reader in locating one or more independently stated pieces of information, recognizing the main theme or author's purpose in a text about a familiar topic, making simple connections between information in the text and common, everyday knowledge. The required information is usually prominent, with minimal or no competing details. The reader is explicitly guided to consider relevant factors in both the task and the text.
1b	262	Tasks at this proficiency level compel the reader to pinpoint a singular explicitly stated detail within a brief, syntactically straightforward text. Whether a narrative or a simple list, the text adheres to a familiar context and structure. Support for the reader is provided through elements like repeated information, visuals, or familiar symbols, minimizing conflicting details. In tasks of interpretation, the reader may be prompted to form straightforward connections between adjoining pieces of information, enhancing their engagement and comprehension.
1c	189	Individuals at Level 1c exhibit fundamental reading comprehension skills, grasping the meaning of short and direct sentences in a literal sense. Their reading is geared towards clear and straightforward objectives, usually within a constrained time. Tasks and texts at this proficiency level incorporate uncomplicated vocabulary and sentence structures, ensuring ease of understanding. The reading materials are intentionally crafted to be accessible, demanding minimal interpretation or inference. While readers at Level 1c display a foundational understanding of reading, their abilities are confined to basic and explicit reading tasks.

Source: OECD (2019), Table 2.4

Table A2. Summary descriptions of the proficiency levels in mathematics

Level	Lower score limit	Characteristics of tasks
6	669	At Level 6, students demonstrate the pinnacle of mathematical proficiency. They exhibit exceptional abilities in conceptualizing, generalizing, and utilizing information gained through investigations and modeling of complex problem situations. These students excel in applying advanced mathematical thinking and reasoning, linking different information sources and representations with ease. Their capacity to translate among various forms of data highlights a high level of flexibility. Moreover, students at Level 6 reflect on their actions, articulating precise communications regarding their findings, interpretations, arguments, and their relevance to the original situation.
5	607	Level 5 signifies a high level of mathematical proficiency, where students highlight their ability to develop and work with models for complex situations. They identify constraints, specify assumptions, and select, compare, and evaluate problem-solving strategies tailored to these intricate models. Students at this level exhibit strategic thinking, utilizing broad, well-developed reasoning skills, appropriate representations, and insight. Furthermore, they begin to reflect on their work, formulating and effectively communicating their interpretations and reasoning.
4	545	At Level 4, students exhibit a solid level of mathematical proficiency. They work effectively with explicit models for complex, concrete situations, integrating various representations, including symbolic ones. In straightforward contexts, these students demonstrate reasoning abilities with some degree of insight. They construct coherent explanations and arguments based on their interpretations, reasoning, and actions, highlighting a well-rounded understanding of mathematical concepts.
3	482	Level 3 represents a foundational level of mathematical proficiency. Students can execute clearly described procedures, including those involving sequential decisions. Their interpretations form a sound base for building simple models or selecting and applying basic problem-solving strategies. While their reasoning may be limited in complexity, students at this level show the ability to manage percentages, fractions, decimal numbers, and work with proportional relationships.
2	407	At Level 2, students demonstrate a basic level of mathematical proficiency. They can interpret and recognize situations within contexts that require no more than direct inference. These students extract

		relevant information from a single source and make use of a single representational mode. Level 2 proficiency involves employing basic algorithms, formulae, procedures, or conventions to solve problems primarily involving whole numbers.
1a	335	Level 1a reflects a basic understanding of mathematical concepts and procedures within familiar contexts. Students at this level answer questions involving well-defined situations where all relevant information is present. They rely on direct instructions and explicit stimuli to conduct routine procedures and actions, performing actions that are almost always obvious and immediately follow from the given stimuli.
1b	262	At Level 1b, students can respond to questions with easy-to-understand contexts, where all needed information is clearly given. They recognize when some information is not relevant and can be ignored. Level 1b proficiency includes the ability to perform simple calculations with whole numbers based on clearly prescribed instructions defined in short, syntactically simple text.
1c	189	Level 1c proficiency involves responding to questions in easy-to-understand contexts with clearly given relevant information in a simple, familiar format and defined in a short, syntactically simple text. Students at this level can follow clear instructions describing a single step or operation.

Source: OECD (2023c), Table 2.4

Table A3. Summary descriptions of the of proficiency levels in science

Level	Lower score limit	Characteristics of tasks
6	708	At Level 6, students exhibit advanced scientific competence by consistently applying their knowledge in intricate life scenarios. They adeptly connect diverse information sources, employing evidence to justify decisions. Their scientific thinking is highly advanced, and they willingly utilize their understanding to address novel scientific and technological challenges. These students are proficient in using scientific knowledge to formulate arguments and provide recommendations for personal, social, or global contexts.
5	633	At Level 5, students demonstrate proficiency in recognizing scientific elements within complex life situations. They adeptly apply scientific concepts and knowledge to these scenarios, evaluating and selecting appropriate scientific evidence. Their well-developed inquiry skills allow

		them to link knowledge effectively and provide critical insights. Students at this level construct explanations grounded in evidence and formulate arguments through critical analysis.
4	559	At Level 4, students demonstrate effectiveness in handling situations involving explicit phenomena, making inferences about the role of science or technology. They can integrate explanations from various scientific disciplines, linking them to real-life situations. Students at this level reflect on their actions, communicating decisions using scientific knowledge and evidence.
3	484	At Level 3, students can identify scientific issues in various contexts, explaining phenomena by selecting relevant facts and knowledge. They apply simple models or inquiry strategies, interpreting and using scientific concepts from different disciplines directly. They can develop concise statements using facts and make decisions based on scientific knowledge.
2	410	At Level 2, students possess sufficient scientific knowledge to offer possible explanations in familiar contexts or draw conclusions based on simple investigations. They can engage in direct reasoning and make literal interpretations of the results of scientific inquiry or technological problem-solving.
1a	335	At Level 1a, students have extremely limited scientific knowledge that can only be applied to a few familiar situations. They are able to provide scientific explanations that are obvious and follow explicitly from given evidence.
1b	261	At Level 1b, students can utilize basic or everyday scientific knowledge to recognize aspects of familiar or simple phenomena. They are capable of identifying simple patterns in data, recognizing basic scientific terms, and following explicit instructions to conduct a scientific procedure.

Source: OECD (2017), Figure 2.25

APPENDIX B

Table I.B1.2.1. Mean score and variation in mathematics performance

			Percentiles				
	Mean	St. dev.	10th	25th	50th	75th	90th
Lebanon	399	108	253	330	406	475	533
OECD average	472	90	355	408	472	535	590
Albania	368	85	266	308	361	423	481
Argentina	378	74	287	325	372	425	477
Australia	487	99	358	416	485	556	619
Austria	487	94	362	420	489	554	608
Baku (Azerbaijan)	397	85	290	336	393	455	511
Belgium	489	96	359	420	492	559	614
Brazil	379	77	288	325	370	425	482
Brunei Darussalam	442	84	337	383	437	499	556
Bulgaria	417	97	298	346	411	483	549
Cambodia	336	73	244	288	336	383	428
Canada	497	94	375	430	496	562	619
Chile	412	77	315	358	409	464	514
Chinese Taipei	547	112	393	470	554	628	687
Colombia	383	73	293	332	378	429	481
Costa Rica	385	66	302	339	382	427	470
Croatia	463	88	352	400	459	524	582
Cyprus	418	101	294	343	411	487	556
Czech Republic	487	93	365	418	486	553	610
Denmark	489	82	383	433	489	545	595
Dominican Republic	339	54	273	302	335	373	410
El Salvador	343	59	272	303	338	380	423
Estonia	510	85	401	450	509	569	620
Finland	484	89	366	420	486	547	600
France	474	91	353	408	475	539	593
Georgia	390	85	288	330	383	444	502
Germany	475	95	351	407	474	541	599
Greece	430	83	326	370	426	487	542
Guatemala	344	69	256	299	343	389	432

Hong Kong (China)	540	105	398	469	545	614	672
Hungary	473	94	348	406	474	538	595
Iceland	459	88	344	396	458	520	574
Indonesia	366	62	290	323	361	404	448
Ireland	492	80	387	437	493	547	594
Israel	458	107	317	380	458	534	597
Italy	471	89	357	408	469	533	589
Jamaica	377	71	291	326	371	423	475
Japan	536	93	410	473	540	601	652
Jordan	361	62	284	318	358	402	442
Kazakhstan	425	78	329	371	421	477	529
Korea	527	105	388	456	531	600	660
Kosovo	355	62	280	311	349	394	438
Latvia	483	80	381	428	481	537	587
Lithuania	475	87	364	413	473	535	591
Macao (China)	552	92	429	489	554	616	670
Malaysia	409	76	317	355	403	456	509
Malta	466	99	333	395	469	537	592
Mexico	395	69	310	347	391	440	487
Moldova	414	80	317	359	408	465	521
Mongolia	425	83	323	366	418	479	537
Montenegro	406	82	306	346	399	460	517
Morocco	365	63	289	321	359	404	449
Netherlands	493	106	348	411	497	574	630
New Zealand	479	99	350	408	478	547	609
North Macedonia	389	83	287	329	382	444	500
Norway	468	93	345	401	469	535	589
Palestinian Authority	366	66	285	319	361	408	452
Panama	357	65	278	311	351	396	443
Paraguay	338	77	241	283	335	389	439
Peru	391	78	295	335	386	442	497
Philippines	355	65	279	308	347	395	443
Poland	489	89	370	426	490	552	604
Portugal	472	90	356	408	471	536	589
Qatar	414	89	307	350	405	469	536

Romania	428	99	303	356	424	495	559
Saudi Arabia	389	66	308	343	385	431	474
Serbia	440	90	329	377	436	499	558
Singapore	575	103	433	505	582	649	702
Slovak Republic	464	101	327	392	468	536	591
Slovenia	485	89	369	421	482	546	604
Spain	473	86	359	414	474	533	584
Sweden	482	96	356	413	483	550	607
Switzerland	508	96	379	439	509	578	632
Thailand	394	76	306	342	385	437	495
Türkiye	453	90	341	387	447	515	576
Ukrainian regions	441	88	329	378	438	501	557
United Arab Emirates	431	101	306	356	423	500	570
United Kingdom	489	96	363	422	489	555	614
United States	465	95	345	396	462	531	590
Uruguay	409	83	303	349	405	466	520
Uzbekistan	364	67	283	318	360	406	453
Viet Nam	469	86	360	412	469	527	580

Table I.B1.3.1. Percentage of students at each proficiency level in mathematics

	Below 1c	Level 1c	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	7,6	9,5	16,2	22,4	22,1	14,7	6,0	1,6	0,0
OECD average	0,3	2,3	9,8	18,7	23,3	22,0	14,9	6,7	2,0
Albania	4,0	15,7	28,8	25,4	16,2	7,1	2,1	0,6	0,1
Argentina	1,4	11,3	29,4	30,8	18,1	6,9	1,7	0,3	0,0
Australia	0,2	1,7	7,9	16,5	22,8	22,3	16,2	8,8	3,5
Austria	0,1	1,5	7,5	15,7	22,5	24,2	18,1	8,1	2,2
Baku (Azerbaijan)	1,8	9,7	22,9	27,6	21,7	11,7	3,9	0,7	0,1
Belgium	0,1	1,7	7,8	15,3	21,5	23,5	18,6	8,9	2,6
Brazil	1,2	11,2	30,7	30,3	16,7	7,0	2,4	0,5	0,1
Brunei Darussalam	0,2	2,8	12,9	26,0	27,3	18,6	9,2	2,8	0,3
Bulgaria	1,6	7,9	20,0	24,2	21,2	14,5	7,5	2,5	0,6
Cambodia	7,6	20,6	33,7	26,1	9,5	2,2	0,3	0,0	0,0
Canada	0,1	1,0	5,7	14,7	22,7	24,8	18,5	9,1	3,3

Chile	0,5	5,2	19,3	30,7	26,0	13,5	4,1	0,6	0,0
Chinese Taipei	0,2	0,9	4,3	9,2	13,5	18,7	21,5	18,0	13,7
Colombia	1,1	9,6	28,4	32,3	19,1	7,7	1,7	0,3	0,0
Costa Rica	0,5	7,6	27,3	36,5	20,9	6,0	1,1	0,2	0,0
Croatia	0,2	1,9	9,3	21,5	26,8	21,7	12,7	4,9	1,0
Cyprus	1,7	8,6	20,2	22,7	20,5	14,5	8,0	3,1	0,8
Czech Republic	0,1	1,2	7,1	17,1	23,2	23,4	17,3	8,1	2,5
Denmark	0,0	0,6	4,7	15,1	26,3	28,1	17,5	6,5	1,3
Dominican Republic	1,5	19,5	45,1	26,4	6,7	0,8	0,1	0,0	0,0
El Salvador	1,9	19,0	42,0	26,5	8,8	1,7	0,2	0,0	0,0
Estonia	0,0	0,3	3,0	11,6	23,3	27,3	21,3	9,9	3,2
Finland	0,1	1,2	7,1	16,4	23,7	25,5	17,4	7,0	1,5
France	0,2	1,9	8,9	17,8	24,2	23,9	15,7	6,2	1,1
Georgia	1,8	10,3	25,9	28,4	19,6	9,4	3,4	1,0	0,2
Germany	0,2	2,2	9,2	18,0	23,6	23,0	15,3	6,7	1,9
Greece	0,5	3,8	16,2	26,8	26,0	17,3	7,5	1,8	0,1
Guatemala	5,1	18,3	35,2	28,2	10,5	2,3	0,3	0,0	0,0
Hong Kong (China)	0,1	0,9	3,8	9,1	14,8	21,0	23,1	16,7	10,6
Hungary	0,2	2,4	9,6	17,3	23,8	23,8	15,1	6,3	1,6
Iceland	0,2	2,4	10,5	21,0	26,2	22,4	12,4	4,2	0,7
Indonesia	1,0	10,9	36,0	33,8	14,1	3,8	0,5	0,0	0,0
Ireland	0,0	0,5	4,2	14,2	25,9	29,0	18,8	6,2	1,0
Israel	1,2	5,2	12,4	18,4	21,1	19,7	13,6	6,2	2,2
Italy	0,2	1,6	8,3	19,5	26,0	23,2	14,2	5,7	1,2
Jamaica	0,9	10,7	30,9	31,3	17,5	7,1	1,4	0,1	0,0
Japan	0,0	0,4	2,7	8,8	16,0	24,0	25,1	16,2	6,8
Jordan	1,2	13,0	35,4	33,2	13,9	3,0	0,3	0,0	0,0
Kazakhstan	0,4	3,4	15,7	30,1	27,5	15,6	5,7	1,4	0,2
Korea	0,3	1,2	4,5	10,2	16,7	22,0	22,2	14,4	8,5
Kosovo	1,4	15,1	38,9	29,6	11,7	2,9	0,3	0,0	0,0
Latvia	0,0	0,6	4,8	16,7	28,4	27,2	15,8	5,2	1,2
Lithuania	0,1	1,1	7,5	19,1	26,5	24,0	14,5	5,8	1,4
Macao (China)	0,0	0,2	1,7	6,5	14,4	23,2	25,4	18,4	10,2
Malaysia	0,2	4,7	21,6	32,5	24,8	11,4	3,7	0,9	0,2
Malta	0,5	3,6	11,4	17,0	22,3	22,7	15,2	5,7	1,5

Mexico	0,6	5,8	24,3	35,1	23,0	9,0	2,0	0,2	0,0
Moldova	0,5	5,0	19,1	31,1	24,8	13,3	4,9	1,1	0,1
Mongolia	0,4	4,2	17,0	29,5	25,1	15,1	6,4	1,9	0,3
Montenegro	0,7	6,9	22,6	29,3	22,4	12,5	4,7	0,9	0,1
Morocco	0,7	11,7	36,7	32,5	14,0	3,9	0,6	0,0	0,0
Netherlands	0,2	2,2	9,8	15,2	18,2	19,8	19,2	11,7	3,7
New Zealand	0,2	2,1	9,3	17,2	22,9	22,6	15,4	7,4	2,9
North Macedonia	1,7	10,6	26,2	27,7	19,9	10,1	3,1	0,6	0,1
Norway	0,3	2,4	10,1	18,7	23,8	23,0	14,9	5,5	1,4
Palestinian Authority	1,3	12,4	34,1	32,1	15,2	4,1	0,7	0,1	0,0
Panama	1,6	15,4	37,1	29,7	12,1	3,3	0,7	0,0	0,0
Paraguay	8,3	22,2	30,7	24,3	11,0	3,0	0,6	0,0	0,0
Peru	1,1	9,0	25,6	30,5	20,8	9,7	2,8	0,5	0,0
Philippines	1,1	16,7	38,6	27,7	12,2	3,2	0,5	0,1	0,0
Poland	0,1	1,1	6,4	15,4	23,8	25,6	18,2	7,5	1,9
Portugal	0,2	1,9	8,3	19,3	25,0	23,0	15,6	5,5	1,1
Qatar	0,6	6,6	21,2	28,0	22,3	12,5	6,0	2,1	0,6
Romania	1,5	7,0	17,1	22,9	22,3	16,4	8,7	3,2	0,8
Saudi Arabia	0,4	6,1	26,9	36,6	21,7	6,7	1,3	0,2	0,0
Serbia	0,7	3,6	13,8	25,0	26,3	18,1	8,8	3,0	0,8
Singapore	0,0	0,3	1,9	5,9	11,2	17,6	22,6	22,0	18,6
Slovak Republic	0,9	4,4	10,9	17,1	22,0	22,6	14,9	5,7	1,6
Slovenia	0,1	1,0	6,7	16,9	25,7	24,2	16,1	7,5	1,9
Spain	0,2	1,7	7,8	17,6	26,2	25,4	15,2	5,0	0,9
Sweden	0,2	1,9	8,3	16,8	22,6	23,5	16,7	7,8	2,1
Switzerland	0,0	0,8	5,4	13,2	20,5	23,5	20,4	11,9	4,2
Thailand	0,5	6,6	27,0	34,2	19,4	8,1	3,2	0,8	0,2
Türkiye	0,1	2,3	12,3	23,9	25,3	19,2	11,3	4,6	0,9
Ukrainian regions	0,4	3,6	14,2	24,3	25,9	19,2	9,3	2,7	0,6
United Arab Emirates	1,0	6,6	18,0	23,3	21,1	15,3	9,2	4,0	1,3
United Kingdom	0,2	1,7	7,2	15,3	23,1	24,2	17,1	8,2	3,1
United States	0,2	2,5	10,4	20,8	23,9	21,5	13,3	5,7	1,6
Uruguay	1,0	7,3	20,4	27,9	24,1	13,6	4,9	0,9	0,1
Uzbekistan	1,7	12,8	34,4	31,8	14,4	4,2	0,7	0,0	0,0
Viet Nam	0,3	1,9	7,3	18,6	28,1	24,7	13,6	4,5	0,9

Table I.B1.4.17. Mathematics performance, by gender

	Female students				Male students			
	Mean	10th perc.	50th perc.	90th perc.	Mean	10th perc.	50th perc.	90th perc.
Lebanon	398	258	405	529	399	249	406	535
OECD average	468	357	467	579	477	353	477	600
Albania	378	280	374	482	359	255	348	481
Argentina	372	284	367	468	383	289	377	485
Australia	481	361	478	605	493	356	491	631
Austria	478	358	479	593	497	366	499	621
Baku (Azerbaijan)	401	300	399	506	394	284	387	517
Belgium	486	359	489	605	493	360	496	623
Brazil	375	289	367	471	383	287	374	493
Brunei Darussalam	448	351	443	552	437	325	430	559
Bulgaria	420	307	416	541	415	291	405	555
Cambodia	338	252	338	426	334	235	334	431
Canada	491	377	490	606	503	373	504	631
Chile	403	311	401	499	420	320	417	524
Chinese Taipei	544	402	549	676	550	384	560	696
Colombia	378	291	374	474	387	296	381	488
Costa Rica	377	298	375	457	392	307	389	480
Croatia	460	355	457	572	466	349	462	590
Cyprus	426	311	422	550	411	282	397	562
Czech Republic	483	367	482	601	491	364	490	618
Denmark	483	383	484	583	495	383	495	606
Dominican Republic	341	277	338	409	337	269	332	412
El Salvador	340	270	336	417	347	273	341	429
Estonia	507	402	506	614	513	400	513	627
Finland	487	377	488	595	482	356	484	604
France	469	357	470	580	479	350	482	605
Georgia	393	295	388	499	387	283	378	506
Germany	469	350	469	589	480	351	480	608
Greece	427	328	424	533	433	323	429	551
Guatemala	338	253	337	424	351	260	350	439

Hong Kong (China)	536	408	540	656	544	391	552	684
Hungary	465	347	467	580	480	348	483	608
Iceland	457	350	456	566	461	339	460	582
Indonesia	369	293	364	451	362	287	357	445
Ireland	485	388	486	580	498	385	500	605
Israel	452	328	453	574	463	307	466	616
Italy	461	357	458	569	482	358	483	605
Jamaica	384	299	379	477	370	283	361	474
Japan	531	416	534	640	540	404	547	663
Jordan	368	292	366	447	353	277	350	435
Kazakhstan	426	335	422	521	425	323	420	538
Korea	525	397	528	647	530	379	535	672
Kosovo	355	281	351	434	355	278	348	443
Latvia	478	381	477	577	488	381	487	597
Lithuania	473	366	471	582	478	360	474	600
Macao (China)	544	429	546	654	559	430	562	683
Malaysia	414	326	410	507	403	309	395	512
Malta	465	339	469	581	467	328	471	602
Mexico	389	308	385	476	401	312	398	498
Moldova	412	321	407	513	416	313	410	529
Mongolia	427	328	422	536	422	319	414	538
Montenegro	406	308	402	510	405	303	396	523
Morocco	367	293	363	446	363	286	356	452
Netherlands	487	344	492	620	498	352	502	639
New Zealand	474	355	473	594	484	346	484	623
North Macedonia	392	292	388	498	386	283	376	503
Norway	469	356	469	581	468	337	468	598
Palestinian Authority	373	292	370	456	357	278	350	446
Panama	355	278	351	437	358	278	351	448
Paraguay	332	238	329	430	343	243	341	448
Peru	384	292	379	484	399	299	394	508
Philippines	362	285	357	448	348	274	337	436
Poland	486	375	487	594	492	366	494	614
Portugal	467	357	465	578	477	355	477	598
Qatar	418	317	413	529	410	299	397	544

Romania	425	305	423	546	430	300	424	572
Saudi Arabia	388	312	385	468	390	305	385	482
Serbia	434	330	432	545	445	328	440	571
Singapore	568	436	575	691	581	431	589	712
Slovak Republic	463	327	471	583	465	328	466	597
Slovenia	485	376	483	597	484	363	480	610
Spain	468	359	469	574	478	359	480	593
Sweden	481	363	481	599	483	350	485	614
Switzerland	502	380	503	621	513	379	515	642
Thailand	397	312	389	493	391	301	380	499
Türkiye	450	342	445	567	456	339	449	586
Ukrainian regions	436	331	434	544	446	327	442	567
United Arab Emirates	435	321	428	561	428	296	416	579
United Kingdom	482	364	480	602	496	362	498	623
United States	458	346	455	574	471	343	469	606
Uruguay	403	302	401	509	414	304	411	529
Uzbekistan	361	284	358	441	367	281	362	463
Viet Nam	464	361	465	570	475	360	473	591

Table I.B1.4.28. Percentage of students at each proficiency level in mathematics, by gender

	Female students								
	Below 1c	Level 1c	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	7,0	9,4	16,4	23,4	22,4	14,3	5,8	1,3	0,0
OECD average	0,2	2,3	9,7	19,4	24,8	22,6	14,2	5,5	1,3
Albania	2,5	12,2	27,2	28,8	19,4	7,6	2,0	0,3	0,0
Argentina	1,6	12,0	31,0	31,2	16,9	6,0	1,2	0,1	0,0
Australia	0,1	1,5	7,7	17,4	24,9	23,4	15,4	7,1	2,5
Austria	0,1	1,6	8,1	17,2	24,2	24,7	16,7	6,2	1,1
Baku (Azerbaijan)	1,4	7,7	21,5	29,8	23,7	12,2	3,3	0,4	0,0
Belgium	0,1	1,7	8,0	15,0	22,6	24,8	18,2	7,8	1,8
Brazil	1,1	11,0	32,3	31,5	16,1	6,0	1,7	0,3	0,0
Brunei Darussalam	0,1	1,7	10,2	26,3	29,5	20,5	9,1	2,3	0,2
Bulgaria	1,2	6,4	18,4	26,0	23,7	15,0	6,8	2,1	0,5
Cambodia	5,9	20,8	34,9	27,0	9,4	1,8	0,3	0,0	0,0

Canada	0,1	0,9	5,4	15,6	24,8	25,8	17,7	7,7	2,1
Chile	0,8	5,8	20,8	32,8	25,5	11,1	3,0	0,3	0,0
Chinese Taipei	0,1	0,7	3,5	8,9	14,2	21,0	22,9	17,5	11,2
Colombia	1,2	10,1	29,3	32,8	18,2	7,0	1,2	0,1	0,0
Costa Rica	0,5	8,7	29,7	37,5	18,6	4,3	0,6	0,1	0,0
Croatia	0,2	1,8	8,9	22,0	28,9	22,0	11,9	3,9	0,5
Cyprus	0,9	5,9	17,8	24,4	23,7	16,4	7,9	2,5	0,5
Czech Republic	0,1	1,2	6,9	17,1	25,1	24,2	16,7	7,0	1,8
Denmark	0,1	0,6	4,6	15,9	28,1	29,0	16,3	4,8	0,6
Dominican Republic	1,1	17,5	46,1	28,1	6,3	0,7	0,0	0,0	0,0
El Salvador	2,0	19,9	42,8	26,0	7,9	1,3	0,1	0,0	0,0
Estonia	0,0	0,3	3,1	11,4	24,5	28,1	21,0	9,3	2,3
Finland	0,1	1,0	5,4	15,8	25,3	27,0	17,9	6,4	1,2
France	0,2	1,7	8,2	18,7	26,8	24,7	14,4	4,5	0,8
Georgia	1,4	8,9	24,8	30,5	21,0	9,8	2,9	0,6	0,1
Germany	0,2	2,1	9,4	19,0	24,7	23,6	14,1	5,6	1,3
Greece	0,3	3,4	16,1	28,3	27,2	17,0	6,3	1,2	0,1
Guatemala	5,6	19,8	37,4	26,4	8,7	1,9	0,2	0,0	0,0
Hong Kong (China)	0,1	0,7	3,2	8,3	16,3	23,4	24,6	15,6	7,7
Hungary	0,2	2,5	9,5	18,5	26,0	24,2	13,5	4,6	0,9
Iceland	0,2	1,8	10,0	21,6	28,1	23,2	11,5	3,3	0,4
Indonesia	0,9	9,8	34,6	35,3	14,9	4,0	0,5	0,0	0,0
Ireland	0,0	0,5	3,9	15,1	28,5	29,8	17,3	4,3	0,5
Israel	0,8	4,2	11,7	20,5	24,5	21,1	12,3	4,1	0,8
Italy	0,2	1,7	8,3	21,5	29,6	23,0	11,5	3,6	0,7
Jamaica	0,7	8,3	28,6	33,5	20,1	7,5	1,2	0,1	0,0
Japan	0,0	0,3	2,3	8,2	17,4	26,3	26,1	14,6	4,8
Jordan	0,8	10,2	33,6	35,8	15,8	3,5	0,3	0,0	0,0
Kazakhstan	0,3	2,8	14,6	31,3	29,4	15,9	4,6	1,0	0,1
Korea	0,1	0,9	3,8	9,7	17,8	24,3	24,0	13,1	6,3
Kosovo	1,3	14,5	38,9	31,1	11,8	2,2	0,2	0,0	0,0
Latvia	0,0	0,5	4,9	16,8	30,7	27,8	14,2	4,1	0,8
Lithuania	0,1	1,1	7,0	19,5	27,4	25,1	14,2	4,8	0,8
Macao (China)	0,0	0,2	1,5	6,6	15,8	25,0	26,5	17,3	7,1
Malaysia	0,2	3,4	18,5	33,3	28,1	12,3	3,5	0,6	0,1

Malta	0,4	3,2	10,1	16,8	25,3	23,7	15,2	4,7	0,6
Mexico	0,6	6,0	26,3	36,6	21,8	7,1	1,4	0,1	0,0
Moldova	0,5	4,4	18,1	33,9	25,7	12,4	4,0	0,8	0,1
Mongolia	0,4	3,7	15,6	29,6	26,4	15,9	6,4	1,8	0,3
Montenegro	0,6	6,3	21,6	30,0	24,2	12,7	4,0	0,4	0,0
Morocco	0,6	10,4	35,7	35,0	14,2	3,7	0,4	0,0	0,0
Netherlands	0,2	2,4	10,3	15,0	19,0	20,4	19,5	10,6	2,6
New Zealand	0,1	1,8	8,7	17,8	25,5	23,8	14,7	6,0	1,6
North Macedonia	1,5	9,3	24,7	29,2	22,1	10,0	2,9	0,4	0,0
Norway	0,2	1,8	8,5	19,3	25,6	24,7	14,6	4,5	0,8
Palestinian Authority	1,0	10,0	31,5	34,8	17,6	4,3	0,7	0,1	0,0
Panama	1,7	15,3	37,5	31,0	11,5	2,7	0,4	0,0	0,0
Paraguay	8,7	24,1	31,4	23,5	9,5	2,3	0,4	0,0	0,0
Peru	1,4	9,6	27,5	31,7	19,5	8,1	1,9	0,2	0,0
Philippines	0,8	13,5	36,4	31,2	14,4	3,3	0,3	0,0	0,0
Poland	0,0	0,8	5,8	15,5	25,7	27,2	17,5	6,3	1,1
Portugal	0,2	1,8	8,2	20,4	26,8	23,6	13,9	4,3	0,8
Qatar	0,5	5,0	18,9	29,6	25,4	13,2	5,4	1,6	0,4
Romania	1,5	6,5	16,4	24,1	24,0	17,1	7,7	2,2	0,4
Saudi Arabia	0,3	5,4	26,4	39,2	22,0	5,8	0,8	0,1	0,0
Serbia	0,9	3,4	13,6	26,5	27,9	17,7	7,5	2,1	0,4
Singapore	0,0	0,2	1,8	5,5	11,8	19,2	24,3	21,8	15,3
Slovak Republic	0,9	4,5	10,6	16,1	22,3	24,3	15,2	4,9	1,2
Slovenia	0,0	0,7	5,8	16,2	27,2	25,4	16,6	6,9	1,3
Spain	0,2	1,7	7,9	18,3	28,1	25,6	13,8	3,9	0,5
Sweden	0,2	1,6	7,3	17,1	24,4	24,5	16,5	6,9	1,5
Switzerland	0,0	0,7	5,3	13,9	22,0	24,0	20,6	10,3	3,1
Thailand	0,4	5,6	24,8	36,4	20,9	8,2	2,9	0,7	0,2
Türkiye	0,1	2,2	12,3	24,8	25,8	19,7	10,9	3,6	0,6
Ukrainian regions	0,4	3,5	13,9	25,6	27,9	18,9	7,4	2,2	0,2
United Arab Emirates	0,6	4,6	15,7	25,7	24,5	16,1	8,7	3,3	0,9
United Kingdom	0,2	1,6	7,1	16,7	25,5	24,6	15,3	6,7	2,4
United States	0,2	2,1	10,6	22,4	25,7	22,1	12,1	4,0	0,8
Uruguay	1,0	7,5	20,9	29,9	24,1	12,1	3,9	0,5	0,0
Uzbekistan	1,6	12,5	35,8	33,5	13,3	2,9	0,4	0,0	0,0

Viet Nam	0,3	1,7	7,4	19,9	29,3	25,2	12,6	3,2	0,5

Male students

	Below 1c	Level 1c	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	8,1	9,7	16,0	21,5	21,8	15,0	6,1	1,9	0,0
OECD average	0,3	2,4	9,9	18,1	21,9	21,3	15,6	7,8	2,7
Albania	5,4	19,0	30,2	22,3	13,3	6,5	2,3	0,8	0,2
Argentina	1,3	10,6	27,7	30,5	19,4	7,8	2,2	0,4	0,0
Australia	0,2	2,0	8,2	15,6	20,8	21,2	17,1	10,4	4,5
Austria	0,2	1,4	6,9	14,2	20,8	23,8	19,5	10,0	3,2
Baku (Azerbaijan)	2,1	11,5	24,1	25,6	19,8	11,3	4,5	1,0	0,2
Belgium	0,1	1,7	7,6	15,6	20,3	22,2	18,9	10,0	3,4
Brazil	1,3	11,4	29,2	29,1	17,2	8,1	3,0	0,7	0,1
Brunei Darussalam	0,4	3,9	15,4	25,7	25,1	16,8	9,2	3,3	0,3
Bulgaria	2,0	9,2	21,3	22,5	19,1	14,1	8,1	2,9	0,7
Cambodia	9,6	20,5	32,3	25,0	9,5	2,6	0,4	0,1	0,0
Canada	0,2	1,2	6,0	14,0	20,6	23,7	19,3	10,5	4,6
Chile	0,3	4,6	17,9	28,7	26,4	15,8	5,2	0,9	0,1
Chinese Taipei	0,2	1,2	5,1	9,5	12,9	16,5	20,1	18,4	16,1
Colombia	0,9	9,0	27,3	31,6	20,1	8,5	2,2	0,4	0,0
Costa Rica	0,4	6,6	24,9	35,5	23,1	7,6	1,6	0,2	0,0
Croatia	0,1	2,1	9,8	21,0	24,9	21,4	13,4	5,8	1,4
Cyprus	2,5	11,1	22,4	21,1	17,4	12,7	8,1	3,6	1,1
Czech Republic	0,1	1,2	7,3	17,2	21,3	22,6	17,9	9,2	3,2
Denmark	0,0	0,6	4,9	14,3	24,5	27,2	18,7	8,0	1,8
Dominican Republic	1,9	21,6	43,9	24,4	7,0	1,0	0,2	0,0	0,0
El Salvador	1,7	17,9	41,1	27,1	9,6	2,2	0,3	0,0	0,0
Estonia	0,0	0,3	3,0	11,9	22,2	26,6	21,6	10,5	3,9
Finland	0,1	1,5	8,8	17,1	22,1	24,1	16,9	7,6	1,9
France	0,2	2,1	9,5	17,0	21,6	23,0	17,1	8,1	1,5
Georgia	2,2	11,6	27,0	26,5	18,2	9,1	3,9	1,2	0,2
Germany	0,1	2,3	9,0	17,0	22,5	22,4	16,4	7,8	2,4
Greece	0,6	4,1	16,2	25,3	24,8	17,6	8,6	2,5	0,2
Guatemala	4,7	16,7	32,9	30,2	12,4	2,7	0,4	0,0	0,0

Hong Kong (China)	0,1	1,1	4,4	9,7	13,5	18,9	21,7	17,6	13,1
Hungary	0,3	2,3	9,6	16,1	21,6	23,3	16,8	8,0	2,2
Iceland	0,3	3,0	10,9	20,4	24,4	21,5	13,3	5,1	1,0
Indonesia	1,0	12,0	37,4	32,3	13,2	3,5	0,4	0,1	0,0
Ireland	0,1	0,6	4,5	13,4	23,4	28,2	20,3	8,1	1,5
Israel	1,7	6,3	13,1	16,3	17,7	18,3	14,9	8,3	3,5
Italy	0,2	1,6	8,3	17,4	22,4	23,3	17,1	7,9	1,8
Jamaica	1,1	13,6	33,6	28,8	14,5	6,6	1,7	0,2	0,0
Japan	0,1	0,5	3,2	9,3	14,5	21,6	24,1	17,8	8,8
Jordan	1,6	16,0	37,4	30,5	11,8	2,5	0,2	0,0	0,0
Kazakhstan	0,5	4,0	16,8	28,9	25,7	15,3	6,8	1,8	0,2
Korea	0,4	1,4	5,2	10,7	15,7	19,9	20,7	15,7	10,4
Kosovo	1,4	15,7	38,9	28,1	11,6	3,7	0,5	0,1	0,0
Latvia	0,1	0,7	4,7	16,5	26,1	26,5	17,4	6,4	1,6
Lithuania	0,1	1,2	8,1	18,7	25,5	22,9	14,8	6,8	2,0
Macao (China)	0,0	0,2	1,9	6,4	13,0	21,6	24,3	19,4	13,2
Malaysia	0,2	6,0	24,6	31,7	21,5	10,5	4,0	1,2	0,3
Malta	0,5	4,0	12,7	17,3	19,4	21,8	15,2	6,7	2,3
Mexico	0,6	5,6	22,2	33,3	24,3	11,1	2,7	0,3	0,0
Moldova	0,5	5,5	19,9	28,6	24,0	14,1	5,8	1,4	0,2
Mongolia	0,4	4,8	18,4	29,4	23,8	14,4	6,5	2,0	0,4
Montenegro	0,8	7,4	23,6	28,6	20,6	12,2	5,2	1,3	0,2
Morocco	0,9	12,9	37,6	30,1	13,7	4,1	0,7	0,0	0,0
Netherlands	0,1	2,0	9,4	15,4	17,5	19,2	18,9	12,7	4,8
New Zealand	0,3	2,4	9,9	16,5	20,4	21,5	16,0	8,9	4,1
North Macedonia	2,0	11,9	27,6	26,3	18,0	10,2	3,3	0,7	0,1
Norway	0,3	3,0	11,7	18,1	22,1	21,3	15,1	6,4	2,0
Palestinian Authority	1,6	15,5	37,4	28,6	12,3	3,8	0,6	0,1	0,0
Panama	1,6	15,5	36,8	28,5	12,7	3,9	1,1	0,0	0,0
Paraguay	7,9	20,2	29,8	25,2	12,6	3,6	0,7	0,0	0,0
Peru	0,8	8,4	23,7	29,3	22,0	11,4	3,7	0,7	0,0
Philippines	1,4	20,0	40,8	24,1	9,9	3,0	0,7	0,1	0,0
Poland	0,1	1,4	6,9	15,4	21,9	24,0	18,9	8,7	2,7
Portugal	0,1	2,0	8,5	18,3	23,3	22,4	17,3	6,7	1,5
Qatar	0,8	8,1	23,6	26,5	19,3	11,9	6,6	2,5	0,7

Romania	1,4	7,6	17,8	21,8	20,6	15,8	9,7	4,1	1,2
Saudi Arabia	0,5	6,8	27,5	33,8	21,5	7,7	1,9	0,3	0,0
Serbia	0,5	3,8	14,0	23,6	24,7	18,5	10,1	3,8	1,2
Singapore	0,0	0,3	1,9	6,2	10,7	16,0	21,0	22,1	21,7
Slovak Republic	0,8	4,2	11,1	18,0	21,7	21,1	14,6	6,4	2,0
Slovenia	0,1	1,2	7,6	17,5	24,4	23,1	15,6	8,0	2,5
Spain	0,2	1,8	7,8	16,8	24,4	25,2	16,5	6,2	1,2
Sweden	0,3	2,2	9,2	16,5	20,8	22,6	16,8	8,8	2,8
Switzerland	0,0	0,9	5,5	12,5	19,1	23,0	20,2	13,4	5,3
Thailand	0,6	7,8	29,3	31,8	17,8	8,0	3,5	1,0	0,3
Türkiye	0,2	2,5	12,3	23,0	24,8	18,7	11,7	5,5	1,2
Ukrainian regions	0,4	3,6	14,4	22,9	23,9	19,4	11,1	3,3	0,9
United Arab Emirates	1,5	8,5	20,2	21,0	18,0	14,6	9,7	4,8	1,7
United Kingdom	0,2	1,7	7,2	14,0	20,9	23,7	18,8	9,7	3,8
United States	0,3	2,9	10,1	19,3	22,2	21,0	14,4	7,5	2,4
Uruguay	0,9	7,0	19,8	26,0	24,1	15,0	5,8	1,2	0,1
Uzbekistan	1,8	13,2	32,9	30,1	15,4	5,4	1,1	0,1	0,0
Viet Nam	0,3	2,1	7,3	17,3	26,9	24,0	14,7	5,9	1,5

Table I.B1.4.3. Socio-economic status and mathematics performance

	ESCS quarter			
	Bottom quarter	Second quarter	Third quarter	Top quarter
Lebanon	366	385	407	437
OECD average	431	462	488	525
Albania	353	358	363	402
Argentina	345	363	385	420
Australia	439	471	506	540
Austria	435	473	510	542
Baku (Azerbaijan)	371	395	402	425
Belgium	434	470	509	551
Brazil	348	365	379	425

Brunei Darussalam	407	423	446	494
Bulgaria	366	400	432	473
Cambodia	329	334	333	350
Canada	460	487	512	536
Chile	384	403	415	453
Chinese Taipei	490	533	559	609
Colombia	352	370	384	430
Costa Rica	m	m	m	m
Croatia	427	446	471	509
Cyprus	379	406	430	471
Czech Republic	429	476	500	545
Denmark	451	480	507	525
Dominican Republic	322	330	339	367
El Salvador	320	334	345	377
Estonia	472	496	520	553
Finland	446	470	499	529
France	422	457	489	535
Georgia	362	378	399	427
Germany	430	464	490	541
Greece	398	415	436	474
Guatemala	319	333	346	379
Hong Kong (China)	511	535	543	576
Hungary	414	455	490	535
Iceland	422	455	469	495
Indonesia	352	359	366	386
Ireland	457	478	505	530
Israel	398	439	483	522
Italy	430	463	480	515
Jamaica	360	372	381	405
Japan	494	526	549	575
Jordan	346	356	360	385
Kazakhstan	410	416	425	451

Korea	479	516	540	577
Kosovo	342	346	353	381
Latvia	448	471	494	522
Lithuania	432	459	489	525
Macao (China)	526	547	554	581
Malaysia	375	393	410	458
Malta	427	454	479	510
Mexico	369	386	398	428
Moldova	379	399	418	461
Mongolia	384	405	431	478
Montenegro	375	396	412	442
Morocco	351	357	358	394
Netherlands	446	470	515	552
New Zealand	430	472	501	532
North Macedonia	356	376	397	431
Norway	431	460	482	512
Palestinian Authority	343	360	368	393
Panama	325	341	359	402
Paraguay	315	324	333	381
Peru	351	379	400	437
Philippines	339	354	351	375
Poland	444	476	502	541
Portugal	429	453	480	529
Qatar	372	400	438	455
Romania	368	408	437	500
Saudi Arabia	369	377	395	416
Serbia	401	429	449	482
Singapore	515	560	600	626
Slovak Republic	394	455	481	528
Slovenia	440	468	500	532
Spain	434	459	485	520
Sweden	436	467	500	535

Switzerland	454	493	524	571
Thailand	375	380	387	435
Türkiye	420	438	453	502
Ukrainian regions	398	423	451	482
United Arab Emirates	388	429	460	456
United Kingdom	458	479	496	544
United States	421	445	473	523
Uruguay	371	394	412	462
Uzbekistan	356	358	364	378
Viet Nam	434	457	473	513

Table I.B1.2.2. Mean score and variation in reading performance

			Percentiles				
	Mean	St. dev.	10th	25th	50th	75th	90th
Lebanon	375	108	234	298	374	452	519
OECD average	476	101	342	406	479	547	603
Albania	358	80	260	302	354	411	465
Argentina	401	92	285	334	397	462	523
Australia	498	111	351	422	502	576	638
Austria	480	104	340	406	485	557	613
Baku (Azerbaijan)	365	85	257	304	363	423	478
Belgium	479	105	337	407	484	555	610
Brazil	410	100	284	339	407	478	544
Brunei Darussalam	429	99	300	358	429	500	561
Bulgaria	404	107	268	326	399	479	550
Cambodia	329	57	256	292	330	367	400
Canada	507	109	365	434	511	583	643
Chile	448	93	329	384	448	513	568
Chinese Taipei	515	105	374	447	523	589	643
Colombia	409	93	291	342	404	473	534
Costa Rica	415	86	305	354	414	474	528

Croatia	475	89	358	415	477	539	590
Cyprus	381	108	245	300	374	456	527
Czech Republic	489	98	359	420	490	558	615
Denmark	489	92	368	427	491	554	605
Dominican Republic	351	84	249	291	345	406	464
El Salvador	365	79	268	309	358	416	473
Estonia	511	92	388	449	514	576	628
Finland	490	104	350	421	497	565	619
France	474	106	331	400	479	549	608
Georgia	374	83	270	314	370	429	486
Germany	480	106	340	406	482	556	616
Greece	438	94	315	372	439	505	561
Guatemala	374	73	283	323	372	422	469
Hong Kong (China)	500	99	366	437	507	569	621
Hungary	473	101	336	404	479	546	599
Iceland	436	103	298	362	437	511	569
Indonesia	359	76	264	306	355	409	459
Ireland	516	88	400	458	521	578	627
Israel	474	122	306	388	481	564	628
Italy	482	92	357	420	487	547	597
Jamaica	410	98	284	340	407	480	540
Japan	516	96	387	451	522	585	636
Jordan	342	77	245	287	339	395	443
Kazakhstan	386	82	288	330	380	435	495
Korea	515	103	379	451	523	587	641
Kosovo	342	67	259	295	338	386	432
Latvia	475	90	358	414	476	537	590
Lithuania	472	94	348	408	474	538	592
Macao (China)	510	90	393	453	515	574	621
Malaysia	388	86	275	326	389	449	499
Malta	445	111	293	366	450	526	588
Mexico	415	84	308	357	414	473	526

Moldova	411	87	297	349	410	472	525
Mongolia	378	77	279	327	379	431	477
Montenegro	405	89	293	341	401	467	525
Morocco	339	76	245	285	336	391	440
Netherlands	459	115	304	371	462	548	608
New Zealand	501	109	354	424	504	580	641
North Macedonia	359	76	263	304	355	411	460
Norway	477	112	323	398	482	558	618
Palestinian Authority	349	77	251	295	349	402	449
Panama	392	94	274	325	388	455	516
Paraguay	373	83	268	315	370	430	484
Peru	408	91	291	343	406	472	529
Philippines	347	85	246	283	335	403	466
Poland	489	104	347	418	495	563	619
Portugal	477	94	352	413	480	543	594
Qatar	419	106	284	342	415	492	561
Romania	428	100	297	357	430	500	559
Saudi Arabia	383	79	281	328	381	437	485
Serbia	440	91	323	377	440	504	558
Singapore	543	106	400	474	551	619	671
Slovak Republic	447	105	306	372	451	524	580
Slovenia	469	97	340	404	473	536	591
Spain	474	97	346	409	478	542	597
Sweden	487	111	337	410	493	568	627
Switzerland	483	105	345	409	486	560	618
Thailand	379	80	279	322	374	431	486
Türkiye	456	87	341	396	458	518	568
Ukrainian regions	428	93	304	363	429	492	546
United Arab Emirates	417	125	256	324	414	508	584
United Kingdom	494	105	357	425	496	567	626
United States	504	111	356	428	506	583	648
Uruguay	430	99	299	359	432	502	559

Uzbekistan	336	66	252	290	333	379	422
Viet Nam	462	77	361	413	465	515	558

Table I.B1.3.2. Percentage of students at each proficiency level in reading

	Below 1c	Level 1c	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	4,1	11,4	21,0	24,8	21,0	12,5	4,5	0,7	0,0
OECD average	0,2	1,9	7,6	16,6	24,4	25,3	16,9	6,0	1,2
Albania	0,9	9,7	30,3	32,8	19,0	6,2	1,0	0,1	0,0
Argentina	0,5	5,2	19,4	29,4	25,8	14,0	4,8	0,9	0,1
Australia	0,3	1,5	6,0	13,4	21,4	25,0	20,1	9,5	2,9
Austria	0,1	1,7	7,4	16,1	23,1	25,5	18,5	6,7	1,0
Baku (Azerbaijan)	1,2	10,0	26,4	31,6	21,3	8,1	1,3	0,1	0,0
Belgium	0,2	2,0	7,5	15,5	23,2	25,9	18,2	6,3	1,0
Brazil	0,8	5,4	17,3	26,8	25,3	15,8	6,7	1,6	0,2
Brunei Darussalam	0,4	4,1	13,8	23,9	26,2	20,2	9,4	1,9	0,2
Bulgaria	1,3	7,6	19,0	25,0	22,5	15,1	7,3	1,9	0,2
Cambodia	0,9	11,0	41,6	38,6	7,6	0,3	0,0	0,0	0,0
Canada	0,2	1,2	4,7	12,0	21,2	25,6	21,4	10,3	3,3
Chile	0,4	1,8	8,8	22,6	29,1	23,9	10,9	2,3	0,2
Chinese Taipei	0,2	0,9	4,0	10,7	19,0	26,9	24,3	11,4	2,6
Colombia	0,4	4,6	17,3	29,1	25,9	15,8	5,9	1,0	0,1
Costa Rica	0,3	3,1	14,7	29,0	30,0	17,3	4,9	0,7	0,1
Croatia	0,0	0,8	5,4	16,5	28,8	28,4	16,0	3,9	0,3
Cyprus	2,3	11,4	22,6	24,3	20,2	12,8	5,0	1,3	0,1
Czech Republic	0,1	0,8	5,0	15,4	24,8	27,0	18,8	6,9	1,1
Denmark	0,1	0,8	4,4	13,8	26,3	29,3	19,1	5,6	0,7
Dominican Republic	1,5	12,5	31,2	30,3	17,2	6,1	1,2	0,1	0,0
El Salvador	0,5	7,9	29,5	34,2	19,4	7,1	1,4	0,1	0,0
Estonia	0,0	0,4	3,0	10,4	22,4	30,0	23,2	9,1	1,5
Finland	0,2	1,7	6,1	13,5	22,6	26,8	20,4	7,5	1,2
France	0,2	2,4	8,1	16,2	23,6	25,5	16,9	6,1	1,0

Georgia	0,7	7,3	25,7	33,1	22,1	8,9	1,9	0,1	0,0
Germany	0,2	1,9	7,2	16,2	23,8	24,7	17,8	6,7	1,4
Greece	0,3	2,7	11,2	23,4	28,3	22,4	9,7	1,9	0,1
Guatemala	0,4	5,3	24,6	38,2	23,7	6,9	0,9	0,1	0,0
Hong Kong (China)	0,2	1,2	4,6	11,4	21,8	29,7	22,1	7,8	1,2
Hungary	0,3	2,0	7,5	16,0	24,4	27,0	17,3	4,9	0,5
Iceland	0,5	4,1	13,1	22,1	24,9	22,0	10,7	2,4	0,3
Indonesia	0,9	8,6	29,6	35,4	19,3	5,4	0,7	0,0	0,0
Ireland	0,0	0,3	2,3	8,7	21,4	31,8	25,2	9,1	1,1
Israel	0,9	4,0	9,5	15,3	20,2	22,1	17,5	8,3	2,2
Italy	0,1	1,0	5,5	14,8	26,0	29,8	17,8	4,6	0,4
Jamaica	0,9	5,3	17,1	26,9	25,1	17,0	6,9	1,0	0,0
Japan	0,1	0,5	3,2	10,0	20,7	27,9	25,2	10,6	1,8
Jordan	1,3	14,0	32,6	31,6	16,4	3,6	0,4	0,0	0,0
Kazakhstan	0,4	4,4	22,3	36,6	23,6	9,1	3,0	0,5	0,0
Korea	0,3	1,0	3,6	9,7	19,4	28,0	24,7	10,8	2,5
Kosovo	0,4	10,4	37,2	35,0	14,4	2,4	0,1	0,0	0,0
Latvia	0,1	0,9	5,3	16,6	29,1	28,6	15,3	3,8	0,4
Lithuania	0,1	1,2	6,6	16,9	27,8	27,1	15,5	4,2	0,5
Macao (China)	0,1	0,6	2,7	9,2	22,4	31,6	24,4	8,0	0,9
Malaysia	0,6	6,7	20,7	30,1	27,2	12,2	2,3	0,2	0,0
Malta	0,8	4,9	12,1	18,5	23,8	22,2	13,3	4,0	0,5
Mexico	0,2	2,8	14,2	29,8	30,8	16,7	5,0	0,6	0,0
Moldova	0,3	3,9	15,9	28,8	29,2	16,8	4,8	0,5	0,0
Mongolia	0,7	6,2	21,6	35,7	26,7	8,3	0,9	0,0	0,0
Montenegro	0,3	4,2	18,3	30,0	26,1	15,6	4,9	0,6	0,0
Morocco	1,5	13,8	34,2	31,6	15,1	3,5	0,3	0,0	0,0
Netherlands	0,3	3,4	12,5	18,3	20,4	21,5	16,6	6,0	1,0
New Zealand	0,1	1,1	6,0	13,5	21,1	24,8	20,3	10,4	2,7
North Macedonia	0,6	8,9	30,4	33,7	20,3	5,5	0,5	0,0	0,0
Norway	0,3	2,7	8,8	15,6	21,9	24,2	17,7	7,1	1,6
Palestinian Authority	1,5	11,7	30,0	34,0	18,5	4,0	0,3	0,0	0,0

Panama	0,8	6,9	20,9	29,1	24,4	12,8	4,2	0,7	0,1
Paraguay	1,0	7,7	24,9	32,6	22,9	9,1	1,7	0,1	0,0
Peru	0,5	4,6	16,8	28,5	27,2	16,6	5,2	0,7	0,0
Philippines	1,0	15,0	33,7	26,6	15,9	6,4	1,3	0,1	0,0
Poland	0,2	1,6	6,5	14,0	22,4	26,9	19,7	7,5	1,3
Portugal	0,1	1,2	6,0	15,8	26,8	28,5	16,8	4,3	0,4
Qatar	0,6	5,5	16,6	24,6	24,3	17,1	8,4	2,5	0,4
Romania	0,7	4,3	13,6	23,2	26,6	20,6	9,1	1,9	0,1
Saudi Arabia	0,4	5,7	22,0	34,5	26,2	9,6	1,5	0,1	0,0
Serbia	0,3	2,0	10,3	23,8	29,7	22,7	9,3	1,7	0,1
Singapore	0,2	0,6	2,7	7,7	15,6	23,8	26,9	17,2	5,4
Slovak Republic	0,5	3,7	11,3	19,9	25,0	23,0	13,2	3,1	0,3
Slovenia	0,2	1,8	7,3	16,8	26,9	27,3	15,3	4,0	0,4
Spain	0,2	1,5	6,5	16,2	26,6	27,5	16,1	4,7	0,6
Sweden	0,2	2,1	7,4	14,6	21,5	24,7	19,3	8,4	1,8
Switzerland	0,1	1,5	6,8	16,2	23,5	24,7	18,6	7,2	1,4
Thailand	0,4	5,8	24,6	34,6	23,5	8,9	2,0	0,2	0,0
Türkiye	0,1	1,1	7,5	20,6	30,5	26,4	12,0	1,8	0,0
Ukrainian regions	0,4	3,5	12,7	24,3	29,7	20,6	7,1	1,4	0,1
United Arab Emirates	2,3	8,8	16,8	20,1	20,2	16,5	10,3	4,0	1,0
United Kingdom	0,2	1,3	5,3	13,3	23,9	26,4	19,5	7,9	2,2
United States	0,1	1,3	5,7	13,0	20,9	25,0	19,8	10,6	3,6
Uruguay	0,4	3,9	13,7	23,1	26,8	20,9	9,2	2,0	0,1
Uzbekistan	0,9	12,3	37,7	35,0	12,2	1,8	0,1	0,0	0,0
Viet Nam	0,0	0,7	5,0	17,2	35,3	30,5	10,0	1,2	0,0

Table I.B1.4.18. Reading performance, by gender

	Female students				Male students			
	Mean	10th perc.	50th perc.	90th perc.	Mean	10th perc.	50th perc.	90th perc.
Lebanon	380	243	380	519	371	227	370	518
OECD average	488	361	491	610	464	327	466	596

Albania	379	285	377	478	339	243	331	446
Argentina	408	294	404	527	394	276	389	520
Australia	509	370	511	643	487	334	492	633
Austria	491	352	496	621	470	329	474	605
Baku (Azerbaijan)	385	283	383	489	347	241	342	462
Belgium	492	354	498	619	465	322	468	600
Brazil	419	298	415	546	402	272	396	541
Brunei Darussalam	447	326	448	568	413	282	409	552
Bulgaria	422	290	419	560	389	254	381	538
Cambodia	338	269	339	406	318	243	318	392
Canada	519	384	522	650	495	348	499	636
Chile	451	337	452	567	445	322	444	569
Chinese Taipei	529	399	534	651	502	356	510	635
Colombia	414	296	410	539	403	286	397	528
Costa Rica	417	310	415	526	414	300	413	530
Croatia	493	380	496	602	459	343	458	576
Cyprus	409	278	406	543	355	226	342	506
Czech Republic	503	377	506	624	474	346	474	604
Denmark	499	383	503	611	479	356	480	599
Dominican Republic	367	268	362	475	333	234	325	449
El Salvador	371	276	365	477	358	262	351	467
Estonia	525	408	528	638	498	372	501	618
Finland	513	384	519	633	468	325	474	602
France	484	348	488	613	464	316	468	603
Georgia	392	291	389	496	357	257	350	472
Germany	490	353	492	622	470	328	471	608
Greece	451	335	452	566	426	300	424	555
Guatemala	379	289	375	475	369	277	367	464
Hong Kong (China)	512	389	518	626	489	348	496	615
Hungary	481	351	488	603	465	323	471	596
Iceland	454	318	458	582	419	285	417	554
Indonesia	370	279	367	466	347	252	342	449

Ireland	525	417	528	631	507	385	512	623
Israel	486	337	491	625	462	282	468	631
Italy	491	376	495	601	472	341	477	592
Jamaica	426	304	425	550	391	268	384	526
Japan	524	404	529	638	508	369	514	633
Jordan	364	270	363	460	318	229	313	417
Kazakhstan	400	309	394	501	373	274	364	487
Korea	533	408	540	651	499	360	505	630
Kosovo	355	275	352	440	330	249	323	423
Latvia	488	376	489	600	461	342	462	578
Lithuania	487	370	490	600	456	331	456	581
Macao (China)	518	409	521	623	503	380	510	619
Malaysia	404	294	407	506	373	263	368	489
Malta	465	318	472	599	426	276	428	573
Mexico	419	314	418	526	411	301	409	525
Moldova	427	320	427	535	397	284	393	513
Mongolia	391	295	392	484	366	266	365	468
Montenegro	423	315	421	537	388	278	381	510
Morocco	350	258	348	447	329	236	323	433
Netherlands	473	320	479	615	447	293	446	600
New Zealand	514	376	517	647	488	336	492	633
North Macedonia	372	278	370	469	346	254	341	448
Norway	498	359	502	629	456	299	459	606
Palestinian Authority	371	278	372	463	322	230	317	420
Panama	401	283	398	525	382	265	377	508
Paraguay	382	280	379	490	364	257	360	478
Peru	412	297	411	530	404	285	402	527
Philippines	364	261	356	479	329	235	314	449
Poland	503	371	509	625	475	329	479	613
Portugal	487	370	490	599	466	337	470	589
Qatar	440	314	437	570	399	266	391	550
Romania	442	317	444	565	415	282	415	551

Saudi Arabia	399	302	398	494	366	267	361	472
Serbia	453	343	455	564	428	309	425	552
Singapore	553	417	559	678	533	384	543	665
Slovak Republic	462	320	470	590	433	297	433	569
Slovenia	491	376	494	602	447	314	449	577
Spain	487	364	490	605	462	331	465	587
Sweden	506	365	511	638	469	316	472	615
Switzerland	495	363	498	623	472	329	473	612
Thailand	391	296	389	493	365	266	357	476
Türkiye	468	360	471	573	444	326	443	562
Ukrainian regions	439	326	440	551	416	288	416	540
United Arab Emirates	440	287	440	593	396	236	384	574
United Kingdom	503	373	503	631	486	344	490	621
United States	515	377	515	653	493	338	497	641
Uruguay	438	311	439	564	423	290	424	554
Uzbekistan	347	269	344	427	325	240	321	415
Viet Nam	471	376	473	562	453	347	455	553

Table I.B1.4.29. Percentage of students at each proficiency level in reading, by gender

	Female students								
	Below 1c	Level 1c	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	3,6	9,7	20,6	26,2	21,7	13,0	4,5	0,7	0,0
OECD average	0,1	1,2	5,7	14,7	24,3	27,1	18,8	6,9	1,4
Albania	0,3	4,8	23,9	36,2	25,4	8,3	1,1	0,1	0,0
Argentina	0,3	4,1	17,7	29,5	27,5	15,0	5,1	0,9	0,1
Australia	0,1	0,9	4,5	11,7	21,6	26,2	21,6	10,1	3,3
Austria	0,1	1,2	6,1	14,5	22,5	26,2	20,3	7,9	1,1
Baku (Azerbaijan)	0,4	5,5	21,4	34,3	26,3	10,4	1,7	0,1	0,0
Belgium	0,1	1,3	5,8	13,4	22,6	27,5	20,6	7,5	1,2
Brazil	0,5	3,8	15,1	27,3	27,6	16,8	7,0	1,7	0,2
Brunei Darussalam	0,2	2,1	9,5	22,8	28,5	23,8	10,9	2,0	0,2

Bulgaria	0,7	4,8	15,4	24,9	25,0	17,9	8,7	2,2	0,3
Cambodia	0,3	7,4	39,0	43,8	8,9	0,4	0,0	0,0	0,0
Canada	0,1	0,7	3,3	10,3	20,3	26,8	23,2	11,5	3,8
Chile	0,5	1,5	7,7	22,0	30,2	25,0	10,7	2,3	0,2
Chinese Taipei	0,1	0,5	2,4	8,5	18,4	27,7	26,3	12,9	3,2
Colombia	0,4	4,0	15,9	28,5	26,7	16,9	6,4	1,1	0,1
Costa Rica	0,2	2,5	14,0	29,7	31,2	17,1	4,6	0,7	0,0
Croatia	0,0	0,4	3,3	12,7	26,6	31,9	19,7	5,1	0,3
Cyprus	0,8	6,4	17,6	25,5	24,9	16,4	6,5	1,7	0,2
Czech Republic	0,0	0,4	3,4	12,4	23,4	29,1	21,7	8,2	1,4
Denmark	0,1	0,5	3,2	11,5	25,1	30,7	21,8	6,2	0,8
Dominican Republic	0,6	8,1	27,8	34,0	20,5	7,5	1,5	0,1	0,0
El Salvador	0,3	6,5	27,3	35,3	21,1	7,9	1,4	0,2	0,0
Estonia	0,0	0,3	1,7	7,9	20,3	31,2	25,7	10,9	1,9
Finland	0,1	0,8	3,3	10,1	20,9	28,6	24,5	9,8	1,8
France	0,1	1,6	6,3	15,1	24,0	27,3	17,9	6,5	1,2
Georgia	0,3	4,1	19,7	34,8	27,4	11,0	2,5	0,2	0,0
Germany	0,1	1,3	5,9	14,8	23,4	26,0	19,2	7,8	1,6
Greece	0,1	1,4	8,4	21,5	30,4	25,1	10,8	2,1	0,2
Guatemala	0,3	4,4	23,4	39,1	23,7	7,9	1,2	0,1	0,0
Hong Kong (China)	0,1	0,6	2,9	9,9	20,5	31,6	24,3	8,7	1,3
Hungary	0,2	1,5	6,0	14,6	24,8	28,8	18,2	5,4	0,5
Iceland	0,2	2,7	10,0	19,5	26,0	24,9	12,9	3,2	0,4
Indonesia	0,6	5,8	26,2	37,7	22,5	6,4	0,8	0,0	0,0
Ireland	0,0	0,1	1,3	6,8	20,4	32,8	27,3	10,0	1,2
Israel	0,2	2,1	7,4	15,0	21,8	24,7	18,8	8,1	1,9
Italy	0,1	0,6	3,7	12,8	26,4	31,7	19,3	5,0	0,4
Jamaica	0,6	3,2	13,5	25,4	27,8	20,0	8,3	1,1	0,1
Japan	0,0	0,2	2,1	8,3	20,5	29,3	26,6	11,1	1,9
Jordan	0,5	7,5	27,6	36,3	21,9	5,5	0,6	0,0	0,0
Kazakhstan	0,1	2,2	16,6	38,3	28,5	10,4	3,2	0,6	0,1
Korea	0,2	0,4	2,2	7,2	17,0	28,6	28,4	12,7	3,3

Kosovo	0,2	6,4	32,6	40,2	17,8	2,6	0,1	0,0	0,0
Latvia	0,0	0,4	3,5	13,6	28,6	30,6	17,9	4,8	0,6
Lithuania	0,0	0,6	4,5	13,6	27,3	30,2	18,1	5,1	0,6
Macao (China)	0,0	0,3	1,9	7,6	21,8	32,9	26,1	8,5	0,9
Malaysia	0,4	4,5	15,5	29,7	32,3	14,9	2,5	0,2	0,0
Malta	0,4	3,1	8,9	16,6	24,1	25,1	16,3	5,0	0,5
Mexico	0,1	2,1	13,1	29,8	32,2	17,0	5,0	0,6	0,0
Moldova	0,2	2,3	11,0	27,6	32,7	19,6	6,0	0,7	0,0
Mongolia	0,4	4,1	17,2	36,4	30,9	9,8	1,1	0,0	0,0
Montenegro	0,2	2,2	13,1	28,6	29,8	19,1	6,3	0,7	0,0
Morocco	0,8	10,4	31,8	34,8	17,6	4,1	0,4	0,0	0,0
Netherlands	0,2	2,4	10,3	16,7	20,7	23,4	18,2	7,0	1,1
New Zealand	0,1	0,5	4,0	11,7	21,0	26,0	21,9	11,7	3,2
North Macedonia	0,3	5,9	26,0	36,2	24,0	6,8	0,7	0,0	0,0
Norway	0,1	1,0	5,3	13,9	21,6	26,9	20,6	8,5	2,1
Palestinian Authority	0,6	5,9	23,9	38,7	24,8	5,7	0,4	0,0	0,0
Panama	0,5	5,7	18,7	28,8	26,2	14,1	4,8	1,0	0,2
Paraguay	0,6	5,7	22,6	34,0	25,0	10,1	2,0	0,1	0,0
Peru	0,4	4,0	15,6	28,5	28,3	17,2	5,2	0,7	0,0
Philippines	0,6	9,8	29,6	30,6	19,5	8,2	1,6	0,0	0,0
Poland	0,0	1,0	4,4	11,4	21,7	29,2	22,4	8,4	1,4
Portugal	0,1	0,8	4,3	13,8	26,7	30,4	18,7	4,8	0,5
Qatar	0,3	2,6	11,7	23,9	27,7	20,7	9,8	2,8	0,5
Romania	0,5	2,9	10,3	22,3	28,4	23,1	10,3	2,2	0,1
Saudi Arabia	0,2	3,2	16,5	34,7	31,6	11,9	1,8	0,1	0,0
Serbia	0,3	1,3	6,8	21,4	31,3	26,3	10,5	2,0	0,1
Singapore	0,1	0,4	1,8	6,2	14,8	24,2	27,4	18,8	6,2
Slovak Republic	0,4	3,1	9,1	16,6	24,5	26,2	16,1	3,7	0,4
Slovenia	0,0	0,6	3,8	12,6	26,6	31,6	19,3	5,0	0,4
Spain	0,1	0,8	4,8	14,1	26,1	29,4	18,3	5,7	0,8
Sweden	0,1	1,1	4,8	12,1	20,6	26,9	21,8	10,1	2,4
Switzerland	0,1	0,8	4,9	14,4	23,5	26,2	20,4	8,0	1,6

Thailand	0,2	3,5	19,9	36,1	27,7	10,1	2,4	0,2	0,0
Türkiye	0,0	0,4	5,0	18,1	31,1	29,7	13,6	2,0	0,1
Ukrainian regions	0,2	2,1	9,7	23,4	32,4	22,7	7,6	1,6	0,2
United Arab Emirates	1,2	5,1	13,1	20,1	23,3	19,5	11,9	4,5	1,2
United Kingdom	0,1	0,8	4,2	11,7	24,4	27,5	20,2	8,3	2,7
United States	0,1	0,5	4,1	11,6	21,3	26,0	20,8	11,5	4,1
Uruguay	0,4	3,0	11,6	23,0	27,5	22,0	10,1	2,1	0,1
Uzbekistan	0,3	7,8	35,7	39,9	14,1	2,0	0,1	0,0	0,0
Viet Nam	0,0	0,4	3,6	14,8	35,4	33,4	11,1	1,3	0,0

Male students

	Below 1c	Level 1c	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	4,4	12,9	21,3	23,6	20,5	12,1	4,5	0,7	0,0
OECD average	0,3	2,5	9,4	18,5	24,5	23,6	15,1	5,2	1,0
Albania	1,5	14,2	36,2	29,7	13,0	4,3	0,9	0,1	0,0
Argentina	0,7	6,4	21,1	29,3	24,1	13,0	4,5	0,8	0,1
Australia	0,4	2,1	7,6	15,1	21,2	23,7	18,6	8,7	2,6
Austria	0,1	2,2	8,6	17,5	23,5	24,9	16,7	5,5	0,9
Baku (Azerbaijan)	1,9	14,1	30,9	29,1	16,9	6,0	1,0	0,1	0,0
Belgium	0,3	2,7	9,3	17,8	23,9	24,3	15,7	5,1	0,8
Brazil	1,1	7,0	19,6	26,3	23,0	14,9	6,4	1,5	0,2
Brunei Darussalam	0,5	6,1	17,9	24,9	24,0	16,8	8,0	1,7	0,1
Bulgaria	1,8	10,1	22,1	25,1	20,2	12,7	6,2	1,7	0,2
Cambodia	1,5	15,3	44,6	32,4	6,0	0,3	0,0	0,0	0,0
Canada	0,4	1,8	6,0	13,7	22,0	24,5	19,7	9,2	2,8
Chile	0,4	2,2	9,9	23,2	27,9	22,8	11,0	2,3	0,2
Chinese Taipei	0,4	1,3	5,5	12,7	19,6	26,2	22,4	9,9	2,1
Colombia	0,5	5,1	18,8	29,8	25,0	14,7	5,3	0,9	0,1
Costa Rica	0,3	3,7	15,4	28,3	28,8	17,4	5,2	0,8	0,1
Croatia	0,1	1,1	7,4	20,0	30,9	25,1	12,5	2,8	0,2
Cyprus	3,8	16,2	27,3	23,1	15,7	9,4	3,5	0,9	0,1

Czech Republic	0,1	1,3	6,6	18,3	26,2	25,0	16,1	5,6	0,9
Denmark	0,1	1,0	5,5	16,0	27,4	27,9	16,5	5,0	0,6
Dominican Republic	2,4	17,5	35,0	26,1	13,4	4,6	0,8	0,1	0,0
El Salvador	0,7	9,3	31,7	33,0	17,5	6,2	1,4	0,1	0,0
Estonia	0,0	0,5	4,2	12,8	24,4	28,8	20,9	7,3	1,1
Finland	0,4	2,5	8,7	16,7	24,2	25,2	16,4	5,4	0,6
France	0,3	3,2	10,0	17,4	23,3	23,7	15,7	5,6	0,8
Georgia	1,1	10,3	31,3	31,6	17,1	7,1	1,4	0,1	0,0
Germany	0,2	2,5	8,4	17,6	24,2	23,5	16,5	5,8	1,3
Greece	0,4	3,9	14,0	25,3	26,4	19,7	8,7	1,6	0,1
Guatemala	0,5	6,2	25,9	37,2	23,8	5,8	0,6	0,0	0,0
Hong Kong (China)	0,3	1,8	6,2	12,7	23,0	28,0	20,0	7,1	1,1
Hungary	0,4	2,6	9,1	17,5	23,9	25,2	16,4	4,5	0,5
Iceland	0,7	5,5	16,1	24,5	23,9	19,2	8,4	1,5	0,2
Indonesia	1,2	11,6	33,1	33,1	16,0	4,4	0,5	0,0	0,0
Ireland	0,0	0,5	3,3	10,6	22,2	30,8	23,1	8,4	1,0
Israel	1,5	5,8	11,6	15,5	18,7	19,6	16,3	8,6	2,5
Italy	0,1	1,5	7,4	16,8	25,5	27,8	16,3	4,3	0,4
Jamaica	1,2	7,6	21,3	28,5	22,1	13,3	5,2	0,8	0,0
Japan	0,1	0,8	4,4	11,6	21,0	26,6	23,9	10,0	1,7
Jordan	2,2	20,9	38,0	26,6	10,5	1,6	0,1	0,0	0,0
Kazakhstan	0,6	6,6	27,7	35,1	19,0	7,8	2,8	0,4	0,0
Korea	0,5	1,5	4,9	12,0	21,5	27,3	21,3	9,1	1,8
Kosovo	0,7	14,4	41,7	29,9	11,1	2,1	0,1	0,0	0,0
Latvia	0,1	1,4	7,1	19,5	29,6	26,5	12,7	2,9	0,2
Lithuania	0,2	1,8	8,8	20,3	28,4	24,0	12,8	3,3	0,4
Macao (China)	0,1	0,9	3,5	10,8	22,9	30,4	22,9	7,5	0,9
Malaysia	0,8	9,0	26,0	30,4	22,0	9,5	2,1	0,3	0,0
Malta	1,2	6,6	15,2	20,3	23,5	19,5	10,4	3,0	0,4
Mexico	0,3	3,5	15,5	29,8	29,1	16,3	4,9	0,5	0,0
Moldova	0,3	5,3	20,3	29,8	26,0	14,2	3,7	0,4	0,0
Mongolia	1,0	8,2	25,8	35,0	22,5	6,8	0,7	0,0	0,0

Montenegro	0,5	6,2	23,2	31,3	22,6	12,3	3,5	0,4	0,0
Morocco	2,2	17,1	36,4	28,4	12,7	2,9	0,2	0,0	0,0
Netherlands	0,5	4,4	14,6	19,8	20,1	19,8	15,0	5,0	0,8
New Zealand	0,2	1,7	8,0	15,2	21,2	23,6	18,7	9,2	2,2
North Macedonia	0,9	11,8	34,3	31,3	17,0	4,2	0,4	0,0	0,0
Norway	0,5	4,4	12,1	17,3	22,3	21,6	15,0	5,7	1,2
Palestinian Authority	2,6	18,9	37,6	28,0	10,8	2,0	0,2	0,0	0,0
Panama	1,2	8,1	23,2	29,3	22,6	11,5	3,6	0,4	0,0
Paraguay	1,5	9,8	27,3	31,2	20,7	8,1	1,3	0,0	0,0
Peru	0,6	5,3	18,0	28,4	26,1	15,9	5,1	0,6	0,0
Philippines	1,5	20,4	37,8	22,5	12,1	4,4	1,1	0,2	0,0
Poland	0,3	2,1	8,5	16,5	23,1	24,6	17,1	6,6	1,1
Portugal	0,2	1,6	7,8	17,7	27,0	26,6	15,0	3,9	0,3
Qatar	0,9	8,4	21,4	25,3	20,9	13,5	7,1	2,1	0,3
Romania	0,9	5,6	16,9	24,0	24,8	18,2	7,8	1,7	0,1
Saudi Arabia	0,6	8,3	27,8	34,3	20,6	7,2	1,3	0,1	0,0
Serbia	0,2	2,7	13,7	26,1	28,2	19,3	8,1	1,5	0,1
Singapore	0,2	0,9	3,5	9,1	16,2	23,4	26,4	15,6	4,7
Slovak Republic	0,7	4,3	13,2	22,9	25,3	20,2	10,6	2,6	0,2
Slovenia	0,4	2,8	10,7	20,7	27,2	23,2	11,5	3,1	0,3
Spain	0,3	2,1	8,2	18,3	27,1	25,7	14,1	3,7	0,5
Sweden	0,4	3,0	9,8	17,0	22,4	22,5	16,8	6,7	1,3
Switzerland	0,2	2,1	8,7	17,9	23,5	23,2	16,9	6,3	1,2
Thailand	0,7	8,2	29,7	33,0	19,0	7,6	1,7	0,1	0,0
Türkiye	0,1	1,8	10,0	23,2	29,9	23,0	10,4	1,6	0,0
Ukrainian regions	0,6	4,9	15,7	25,3	27,0	18,6	6,7	1,1	0,1
United Arab Emirates	3,4	12,3	20,3	20,0	17,2	13,6	8,8	3,5	0,9
United Kingdom	0,2	1,9	6,5	14,7	23,3	25,3	18,8	7,5	1,7
United States	0,2	2,0	7,4	14,4	20,4	24,1	18,7	9,7	3,1
Uruguay	0,5	4,8	15,6	23,1	26,0	19,7	8,3	1,8	0,1
Uzbekistan	1,4	16,6	39,7	30,3	10,3	1,6	0,0	0,0	0,0
Viet Nam	0,1	1,1	6,4	19,8	35,1	27,5	8,9	1,0	0,0

Table I.B1.4.4. Socio-economic status and reading performance

	ESCS quarter			
	Bottom quarter	Second quarter	Third quarter	Top quarter
Lebanon	339	360	384	419
OECD average	434	465	492	527
Albania	344	353	355	386
Argentina	362	385	408	448
Australia	453	481	519	548
Austria	426	465	504	538
Baku (Azerbaijan)	342	364	369	394
Belgium	425	460	501	540
Brazil	375	396	412	462
Brunei Darussalam	385	406	435	492
Bulgaria	345	389	421	467
Cambodia	325	330	328	333
Canada	472	499	522	546
Chile	414	441	457	489
Chinese Taipei	468	504	527	565
Colombia	367	392	414	469
Costa Rica	m	m	m	m
Croatia	443	463	482	517
Cyprus	345	373	392	428
Czech Republic	434	479	501	544
Denmark	450	480	510	523
Dominican Republic	326	337	351	395
El Salvador	334	352	367	409
Estonia	477	498	523	550
Finland	452	476	509	536
France	421	456	492	535

Georgia	343	364	387	411
Germany	435	469	493	548
Greece	402	424	446	484
Guatemala	348	362	377	410
Hong Kong (China)	477	500	505	523
Hungary	412	453	492	536
Iceland	394	431	449	476
Indonesia	343	349	359	385
Ireland	479	504	530	555
Israel	412	458	503	535
Italy	442	475	492	521
Jamaica	386	403	416	446
Japan	478	508	530	551
Jordan	321	335	343	374
Kazakhstan	366	379	387	413
Korea	471	503	530	559
Kosovo	331	334	340	366
Latvia	438	462	487	516
Lithuania	432	457	487	518
Macao (China)	495	507	509	531
Malaysia	357	375	387	435
Malta	403	435	459	495
Mexico	378	402	423	459
Moldova	370	395	417	462
Mongolia	341	363	387	423
Montenegro	374	394	413	440
Morocco	329	334	333	363
Netherlands	414	439	483	518
New Zealand	457	495	522	551
North Macedonia	332	348	365	394
Norway	434	467	495	523
Palestinian Authority	330	346	349	375

Panama	346	378	401	449
Paraguay	351	360	366	419
Peru	360	397	419	458
Philippines	324	346	341	376
Poland	443	477	502	542
Portugal	438	463	483	527
Qatar	375	407	445	464
Romania	371	411	438	495
Saudi Arabia	360	370	388	413
Serbia	405	430	448	479
Singapore	484	527	567	596
Slovak Republic	386	441	459	504
Slovenia	429	454	487	509
Spain	438	462	487	518
Sweden	435	471	510	544
Switzerland	425	467	503	549
Thailand	356	363	377	420
Türkiye	428	443	457	497
Ukrainian regions	383	411	441	467
United Arab Emirates	371	416	453	443
United Kingdom	468	487	499	550
United States	459	487	513	560
Uruguay	391	417	435	483
Uzbekistan	327	330	336	350
Viet Nam	427	452	468	501

Table I.B1.2.3. Mean score and variation in science performance

			Percentiles				
	Mean	St. dev.	10th	25th	50th	75th	90th
Lebanon	396	100	263	328	398	466	523
OECD average	485	97	356	416	486	554	611

Albania	376	83	275	318	371	429	485
Argentina	406	86	301	345	401	463	521
Australia	507	109	364	430	508	583	647
Austria	491	101	356	418	495	565	622
Baku (Azerbaijan)	380	78	283	324	376	432	484
Belgium	491	101	352	419	496	564	618
Brazil	403	94	288	337	396	463	529
Brunei Darussalam	446	94	327	378	442	512	571
Bulgaria	421	95	302	351	415	487	549
Cambodia	347	51	283	314	347	381	411
Canada	515	101	383	446	516	584	643
Chile	444	92	326	379	443	508	564
Chinese Taipei	537	103	397	469	544	611	664
Colombia	411	87	303	349	406	469	528
Costa Rica	411	80	309	355	408	464	515
Croatia	483	93	362	417	482	548	605
Cyprus	411	105	280	332	404	485	553
Czech Republic	498	99	368	427	498	568	628
Denmark	494	95	370	427	495	560	615
Dominican Republic	360	69	275	312	356	405	452
El Salvador	373	74	284	322	367	419	472
Estonia	526	89	409	465	527	588	641
Finland	511	106	370	437	514	586	647
France	487	103	350	414	490	561	620
Georgia	384	81	285	328	379	436	491
Germany	492	106	352	417	493	567	631
Greece	441	91	323	376	441	505	560
Guatemala	373	65	294	329	369	414	458
Hong Kong (China)	520	93	394	458	526	586	636
Hungary	486	96	357	417	487	555	611
Iceland	447	95	324	378	446	514	571
Indonesia	383	71	296	336	381	429	474

Ireland	504	91	384	441	506	569	621
Israel	465	109	320	385	466	544	605
Italy	477	93	356	413	480	543	597
Jamaica	403	94	286	334	397	466	531
Japan	547	93	421	484	552	614	663
Jordan	375	74	282	322	371	424	473
Kazakhstan	423	78	329	371	419	471	524
Korea	528	105	387	459	535	603	657
Kosovo	357	66	278	311	351	399	446
Latvia	494	85	385	434	493	553	604
Lithuania	484	92	364	419	484	548	605
Macao (China)	543	88	426	487	549	604	651
Malaysia	416	79	317	360	414	469	519
Malta	466	102	328	391	469	540	597
Mexico	410	75	315	357	408	461	508
Moldova	417	83	314	358	412	473	528
Mongolia	412	76	316	359	410	464	513
Montenegro	403	84	298	343	399	461	515
Morocco	365	67	283	318	360	408	456
Netherlands	488	112	340	401	489	574	636
New Zealand	504	107	362	428	506	581	643
North Macedonia	380	82	279	321	374	435	490
Norway	478	106	338	401	480	555	614
Palestinian Authority	369	72	280	319	365	416	464
Panama	388	88	281	327	382	444	504
Paraguay	368	77	273	314	364	419	469
Peru	408	86	300	347	404	466	522
Philippines	356	78	266	302	346	403	464
Poland	499	96	370	432	502	568	623
Portugal	484	92	364	419	485	550	603
Qatar	432	97	313	361	425	496	564
Romania	428	96	303	356	426	496	556

Saudi Arabia	390	70	304	342	387	436	482
Serbia	447	91	332	383	445	510	567
Singapore	561	99	425	497	569	632	684
Slovak Republic	462	103	324	391	465	536	593
Slovenia	500	94	376	434	500	566	622
Spain	485	92	363	422	486	548	601
Sweden	494	108	350	414	497	572	633
Switzerland	503	99	370	429	504	575	631
Thailand	409	82	309	352	403	462	518
Türkiye	476	89	361	411	474	540	595
Ukrainian regions	450	90	334	386	449	513	567
United Arab Emirates	432	110	296	350	424	510	582
United Kingdom	500	104	363	427	500	572	634
United States	499	108	357	421	502	577	639
Uruguay	435	92	318	369	433	500	557
Uzbekistan	355	63	276	312	353	396	437
Viet Nam	472	78	372	420	473	525	572

Table I.B1.3.3. Percentage of students at each proficiency level in science

	Below 1b	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	9,6	17,5	27,4	26,2	14,5	4,2	0,6	0,0
OECD average	1,1	6,3	17,1	25,2	25,7	17,2	6,3	1,2
Albania	6,9	25,6	34,8	22,5	8,1	1,8	0,2	0,0
Argentina	3,4	17,5	33,0	27,5	13,8	4,1	0,5	0,0
Australia	1,0	4,8	13,7	22,2	25,3	20,3	9,6	3,0
Austria	0,8	5,8	16,0	23,6	26,7	19,2	6,9	1,0
Baku (Azerbaijan)	5,2	24,5	36,1	24,2	8,4	1,4	0,1	0,0
Belgium	1,0	6,3	15,2	23,3	27,4	19,8	6,4	0,7
Brazil	5,1	19,1	31,2	25,4	13,2	4,8	1,0	0,2
Brunei Darussalam	1,5	10,5	25,1	28,6	21,7	10,2	2,2	0,2
Bulgaria	3,1	16,3	28,6	26,2	17,4	6,9	1,4	0,1

Cambodia	4,5	35,6	49,5	9,9	0,5	0,0	0,0	0,0
Canada	0,5	3,3	11,5	22,3	28,5	22,0	9,4	2,5
Chile	2,1	9,9	24,4	30,3	22,3	9,2	1,7	0,1
Chinese Taipei	0,4	2,6	9,1	17,2	26,4	26,6	14,2	3,6
Colombia	3,1	16,5	31,9	28,3	15,0	4,6	0,7	0,0
Costa Rica	2,4	15,0	33,4	31,2	14,2	3,4	0,4	0,0
Croatia	0,6	5,0	16,9	28,5	27,4	16,2	4,9	0,5
Cyprus	6,3	19,7	25,8	23,0	16,2	7,0	1,8	0,2
Czech Republic	0,6	4,2	15,1	24,9	27,4	18,9	7,5	1,5
Denmark	0,5	4,1	14,9	26,4	28,7	18,5	6,0	1,0
Dominican Republic	6,2	31,4	39,0	18,7	4,2	0,4	0,0	0,0
El Salvador	5,0	26,5	39,4	21,2	6,8	1,0	0,1	0,0
Estonia	0,1	1,5	8,5	21,9	31,7	24,7	9,8	1,8
Finland	0,8	4,4	12,8	21,6	26,6	21,2	9,9	2,8
France	1,2	6,5	16,2	23,8	26,8	17,9	6,7	1,1
Georgia	5,1	23,2	36,3	24,0	9,0	2,2	0,2	0,0
Germany	1,0	6,4	15,5	24,0	25,4	18,0	7,8	1,9
Greece	2,0	10,8	24,6	30,1	22,4	8,7	1,4	0,1
Guatemala	3,1	25,5	44,4	21,7	4,7	0,5	0,0	0,0
Hong Kong (China)	0,2	2,6	10,0	20,8	30,2	25,4	9,3	1,4
Hungary	0,6	5,5	16,8	25,9	27,3	17,7	5,5	0,6
Iceland	1,9	10,5	23,4	28,6	22,9	10,4	2,1	0,1
Indonesia	3,6	21,2	41,1	26,3	7,0	0,8	0,0	0,0
Ireland	0,4	3,1	12,1	25,4	30,4	21,0	6,8	0,8
Israel	2,6	10,2	19,3	24,0	23,2	15,0	4,9	0,9
Italy	0,9	5,6	17,4	27,9	28,3	15,6	3,9	0,4
Jamaica	5,2	20,1	29,4	25,5	13,8	5,2	0,9	0,0
Japan	0,1	1,4	6,5	17,0	27,7	29,3	15,0	3,0
Jordan	5,3	25,9	37,7	23,3	6,8	0,9	0,0	0,0
Kazakhstan	1,3	10,3	33,6	34,6	15,2	4,2	0,8	0,1
Korea	1,0	3,2	9,5	18,4	27,0	25,2	12,7	3,0
Kosovo	5,2	34,7	39,3	16,7	3,7	0,3	0,0	0,0

Latvia	0,2	2,5	13,8	29,8	30,9	17,7	4,6	0,6
Lithuania	0,5	4,6	16,7	28,4	28,1	16,3	4,8	0,7
Macao (China)	0,2	1,2	6,1	16,6	30,5	30,7	12,7	2,0
Malaysia	1,5	14,0	32,4	32,6	15,7	3,3	0,4	0,1
Malta	1,8	9,5	19,0	25,3	25,1	14,8	4,1	0,5
Mexico	2,0	13,9	35,0	32,7	13,9	2,5	0,1	0,0
Moldova	2,1	14,2	32,3	30,1	16,0	4,8	0,5	0,0
Mongolia	1,8	13,6	34,3	32,5	14,7	2,9	0,2	0,0
Montenegro	3,4	18,5	33,0	27,4	14,1	3,3	0,3	0,0
Morocco	4,3	30,6	40,6	19,5	4,6	0,4	0,0	0,0
Netherlands	1,2	7,8	18,3	21,3	22,0	18,8	8,9	1,6
New Zealand	0,9	5,1	14,3	21,8	25,9	20,0	9,8	2,2
North Macedonia	5,9	25,7	33,8	23,3	9,4	1,8	0,1	0,0
Norway	1,5	8,0	18,2	23,8	24,5	17,0	5,8	1,2
Palestinian Authority	5,5	27,8	39,1	21,3	5,6	0,7	0,0	0,0
Panama	6,1	22,5	33,6	23,7	10,8	2,8	0,5	0,0
Paraguay	6,9	28,2	36,0	21,5	6,3	1,0	0,0	0,0
Peru	3,4	17,0	32,2	28,2	14,8	4,0	0,5	0,0
Philippines	8,3	35,8	33,1	16,0	5,6	1,0	0,1	0,0
Poland	0,4	4,4	13,8	24,3	28,9	20,1	7,0	1,0
Portugal	0,6	4,7	16,5	27,8	28,2	17,3	4,4	0,5
Qatar	2,2	13,9	27,6	27,7	17,8	8,0	2,4	0,4
Romania	3,2	14,9	25,9	27,0	19,6	8,0	1,3	0,1
Saudi Arabia	2,3	19,3	40,6	28,2	8,4	1,1	0,0	0,0
Serbia	1,6	9,1	24,5	30,7	22,5	9,5	2,0	0,2
Singapore	0,2	1,5	6,2	13,9	24,2	29,7	18,9	5,6
Slovak Republic	2,6	9,3	18,7	26,3	24,7	14,0	3,8	0,5
Slovenia	0,3	3,5	13,9	25,7	29,0	19,5	6,9	1,1
Spain	0,7	4,7	15,9	27,8	29,5	16,5	4,4	0,5
Sweden	1,2	6,3	16,2	22,1	25,0	19,2	8,2	1,8
Switzerland	0,4	4,1	14,8	23,7	26,6	21,0	8,1	1,5
Thailand	2,3	15,6	35,2	28,8	13,8	3,8	0,6	0,0

Türkiye	0,4	4,8	19,5	29,4	26,7	15,2	3,7	0,2
Ukrainian regions	1,3	9,0	23,8	30,3	23,9	9,7	2,0	0,1
United Arab Emirates	4,4	15,8	24,8	23,2	17,7	10,2	3,3	0,6
United Kingdom	0,7	5,0	14,4	24,3	26,4	19,2	8,1	2,0
United States	1,1	5,6	15,3	22,4	24,8	19,9	8,8	2,2
Uruguay	2,2	11,9	26,4	29,3	20,6	8,1	1,5	0,1
Uzbekistan	6,0	32,5	42,6	16,5	2,2	0,1	0,0	0,0
Viet Nam	0,5	3,6	16,9	34,4	31,2	11,5	1,7	0,1

Table I.B1.4.19. Science performance, by gender

	Female students				Male students			
	Mean	10th perc.	50th perc.	90th perc.	Mean	10th perc.	50th perc.	90th perc.
Lebanon	397	269	399	518	395	258	397	527
OECD average	485	362	486	605	485	351	486	616
Albania	391	291	388	494	362	264	354	473
Argentina	403	301	398	515	409	301	404	528
Australia	506	370	506	640	508	358	510	654
Austria	485	354	489	612	497	358	500	630
Baku (Azerbaijan)	387	293	385	483	374	275	368	484
Belgium	491	353	498	614	491	351	494	624
Brazil	400	291	395	519	406	286	398	538
Brunei Darussalam	452	338	449	569	440	317	434	573
Bulgaria	430	315	426	550	413	294	403	548
Cambodia	351	290	352	411	342	275	341	410
Canada	515	389	516	638	515	378	517	648
Chile	436	323	437	552	450	329	450	574
Chinese Taipei	536	406	541	655	539	388	548	672
Colombia	408	302	404	523	414	305	409	533
Costa Rica	404	306	401	504	418	313	415	527
Croatia	488	371	488	607	477	355	475	603
Cyprus	426	297	424	558	397	268	385	547

Czech Republic	499	372	500	624	497	364	496	632
Denmark	490	370	492	606	497	369	498	624
Dominican Republic	367	283	363	455	353	268	348	449
El Salvador	372	285	367	468	374	283	368	478
Estonia	528	415	528	639	524	403	526	642
Finland	522	389	524	651	500	356	502	643
France	488	358	491	613	487	342	490	627
Georgia	391	294	389	493	377	277	369	489
Germany	492	358	494	626	493	347	493	636
Greece	446	334	447	558	436	315	434	561
Guatemala	370	293	365	454	376	296	372	461
Hong Kong (China)	520	402	526	629	520	387	526	643
Hungary	484	360	486	604	488	354	489	617
Iceland	454	334	454	574	440	315	439	568
Indonesia	385	300	384	475	380	293	377	474
Ireland	501	389	503	610	507	378	509	631
Israel	465	336	466	592	465	307	467	617
Italy	474	362	475	586	481	349	485	606
Jamaica	412	297	409	534	392	276	384	526
Japan	546	429	550	655	548	414	554	669
Jordan	390	298	388	486	358	269	353	452
Kazakhstan	426	337	423	519	421	323	414	530
Korea	530	399	535	651	526	376	535	663
Kosovo	360	281	355	446	354	275	347	445
Latvia	493	389	492	598	495	381	493	610
Lithuania	487	372	487	601	482	357	480	609
Macao (China)	542	432	548	643	544	419	550	658
Malaysia	423	328	423	518	410	309	404	519
Malta	472	339	476	598	460	321	461	597
Mexico	404	313	401	498	417	318	416	518
Moldova	421	322	417	526	413	307	407	530
Mongolia	420	326	418	517	405	308	401	508

Montenegro	407	304	406	513	399	294	392	518
Morocco	370	290	366	457	361	278	354	454
Netherlands	487	341	489	630	489	340	489	641
New Zealand	504	370	507	636	504	353	506	651
North Macedonia	388	287	383	496	373	273	365	485
Norway	485	354	488	612	472	325	472	617
Palestinian Authority	382	296	379	473	352	266	346	448
Panama	387	281	382	502	389	280	382	508
Paraguay	367	275	363	463	370	272	365	476
Peru	401	297	397	509	415	303	411	533
Philippines	363	271	355	469	349	262	336	455
Poland	500	378	504	616	498	363	500	629
Portugal	485	369	487	599	484	360	484	607
Qatar	443	327	438	566	422	302	410	562
Romania	428	306	429	549	427	301	422	563
Saudi Arabia	398	313	396	487	383	296	378	476
Serbia	449	340	448	562	446	325	442	571
Singapore	558	428	565	676	565	423	574	691
Slovak Republic	466	325	473	592	459	324	458	595
Slovenia	508	390	508	623	493	365	491	622
Spain	482	365	484	595	487	363	489	608
Sweden	498	361	502	629	489	340	491	638
Switzerland	502	375	505	625	503	366	504	636
Thailand	414	319	410	516	404	301	395	521
Türkiye	478	368	477	591	473	354	471	599
Ukrainian regions	450	340	450	561	450	328	448	573
United Arab Emirates	441	311	434	582	424	284	413	583
United Kingdom	496	365	494	627	504	361	506	640
United States	496	363	497	627	503	350	506	649
Uruguay	431	319	429	548	440	318	437	566
Uzbekistan	357	282	356	433	353	271	349	440
Viet Nam	470	374	471	565	475	371	476	580

Table I.B1.4.29. Percentage of students at each proficiency level in science, by gender

	Female students							
	Below 1b	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	8,6	17,0	28,9	27,0	14,6	3,6	0,4	0,0
OECD average	0,9	5,8	16,7	26,1	26,9	17,1	5,7	0,9
Albania	4,4	20,1	36,1	27,1	10,2	2,0	0,2	0,0
Argentina	3,2	17,6	34,6	27,7	12,8	3,6	0,4	0,0
Australia	0,8	4,2	13,6	23,4	26,8	20,0	8,6	2,6
Austria	0,9	6,0	16,7	24,8	26,6	18,6	5,7	0,6
Baku (Azerbaijan)	3,7	21,3	37,9	27,3	8,5	1,2	0,0	0,0
Belgium	1,0	6,2	14,3	23,3	28,8	20,3	5,7	0,5
Brazil	4,8	18,8	32,8	26,3	12,3	4,0	0,8	0,1
Brunei Darussalam	0,9	8,4	23,8	30,8	23,7	10,3	1,8	0,2
Bulgaria	2,2	12,9	27,9	29,6	19,1	7,1	1,2	0,1
Cambodia	3,4	32,6	53,3	10,4	0,3	0,0	0,0	0,0
Canada	0,3	2,8	11,1	23,1	29,9	22,0	8,8	2,0
Chile	2,4	10,3	25,8	31,8	21,1	7,4	1,1	0,1
Chinese Taipei	0,1	2,0	8,4	18,1	29,1	26,6	13,0	2,6
Colombia	3,1	17,0	32,5	28,3	14,4	4,1	0,5	0,0
Costa Rica	2,6	16,3	35,3	30,8	12,5	2,3	0,2	0,0
Croatia	0,5	4,2	15,1	28,4	29,2	17,2	5,0	0,5
Cyprus	4,1	15,6	25,3	26,5	18,6	7,6	2,0	0,3
Czech Republic	0,5	3,8	14,2	25,3	28,8	19,1	7,1	1,2
Denmark	0,5	4,0	14,7	27,5	29,9	17,9	4,9	0,5
Dominican Republic	4,8	28,5	41,3	20,6	4,5	0,3	0,0	0,0
El Salvador	5,0	26,6	40,0	21,4	6,2	0,7	0,1	0,0
Estonia	0,1	1,1	7,7	21,8	33,0	25,1	9,6	1,6
Finland	0,5	3,0	10,3	21,0	28,4	22,9	11,0	2,8
France	1,0	5,5	15,4	25,1	28,7	17,6	5,8	0,9
Georgia	4,0	19,7	37,0	27,3	9,8	1,9	0,2	0,0

Germany	0,8	5,7	15,5	24,5	27,0	17,7	7,2	1,6
Greece	1,4	8,9	24,1	31,6	24,2	8,7	1,1	0,1
Guatemala	3,1	26,8	45,4	19,7	4,6	0,5	0,0	0,0
Hong Kong (China)	0,2	2,0	9,2	21,2	32,9	25,5	8,0	1,0
Hungary	0,5	5,3	16,6	26,8	28,8	16,7	4,7	0,5
Iceland	1,2	8,9	22,3	29,9	24,3	10,9	2,3	0,1
Indonesia	3,1	19,9	41,5	27,5	7,2	0,8	0,0	0,0
Ireland	0,3	2,5	12,1	26,6	32,3	20,6	5,0	0,5
Israel	1,6	8,3	19,8	27,5	25,0	13,8	3,6	0,5
Italy	0,7	4,8	17,6	31,1	29,1	13,6	3,0	0,2
Jamaica	3,8	17,3	29,2	27,8	15,5	5,5	0,8	0,0
Japan	0,0	1,1	5,7	17,5	29,5	30,2	13,7	2,3
Jordan	3,2	19,9	38,2	28,3	9,0	1,3	0,1	0,0
Kazakhstan	0,8	8,6	33,1	37,7	15,7	3,5	0,6	0,1
Korea	0,5	2,4	9,1	19,3	28,2	26,3	11,6	2,6
Kosovo	4,8	32,5	41,0	17,9	3,6	0,2	0,0	0,0
Latvia	0,1	2,2	13,1	31,0	32,1	17,1	3,9	0,5
Lithuania	0,3	3,8	15,4	29,1	29,7	16,9	4,3	0,5
Macao (China)	0,1	0,9	5,3	17,0	31,8	32,3	11,1	1,5
Malaysia	1,1	11,0	31,2	36,0	17,4	3,0	0,3	0,1
Malta	1,5	7,9	17,4	26,4	27,3	15,1	4,1	0,3
Mexico	2,1	14,7	37,7	32,0	11,6	1,8	0,1	0,0
Moldova	1,7	11,9	32,4	33,1	16,0	4,5	0,4	0,0
Mongolia	1,4	10,9	32,9	35,3	16,2	3,1	0,1	0,0
Montenegro	3,0	16,5	32,2	30,2	15,0	2,9	0,2	0,0
Morocco	3,4	28,0	42,5	20,9	4,8	0,4	0,0	0,0
Netherlands	1,2	7,7	17,9	21,7	22,9	19,1	8,3	1,2
New Zealand	0,7	4,2	13,8	22,6	27,7	20,5	8,9	1,5
North Macedonia	4,7	22,7	34,1	25,8	10,6	2,0	0,1	0,0
Norway	0,9	5,8	17,4	24,8	26,8	17,8	5,5	1,1
Palestinian Authority	3,2	22,2	41,1	25,7	7,0	0,7	0,0	0,0
Panama	6,0	22,1	34,0	24,1	10,7	2,7	0,3	0,0

Paraguay	6,5	28,5	37,5	21,2	5,4	0,8	0,0	0,0
Peru	3,7	18,1	34,0	28,2	12,9	2,9	0,2	0,0
Philippines	7,1	32,0	34,9	18,6	6,3	1,0	0,1	0,0
Poland	0,3	3,8	12,6	25,3	31,2	20,2	6,0	0,7
Portugal	0,6	4,3	15,5	28,6	29,8	17,0	3,8	0,4
Qatar	1,3	10,8	25,5	30,7	20,5	8,4	2,4	0,4
Romania	3,0	13,8	25,6	29,0	20,5	7,2	0,8	0,0
Saudi Arabia	1,6	15,9	40,6	31,3	9,6	1,1	0,0	0,0
Serbia	1,5	7,4	24,0	32,6	23,7	9,2	1,5	0,1
Singapore	0,1	1,4	5,9	14,1	25,9	30,6	17,6	4,4
Slovak Republic	2,7	9,1	16,7	26,1	26,7	14,7	3,6	0,5
Slovenia	0,1	2,5	11,7	25,1	31,7	21,0	7,0	1,0
Spain	0,7	4,6	15,7	29,1	30,2	15,8	3,6	0,3
Sweden	0,7	5,2	14,8	23,1	27,1	20,1	7,7	1,3
Switzerland	0,3	3,7	14,1	24,1	28,3	21,1	7,3	1,2
Thailand	1,6	13,2	34,9	32,1	14,3	3,4	0,5	0,0
Türkiye	0,2	4,0	18,7	30,2	27,9	15,7	3,2	0,1
Ukrainian regions	1,2	7,8	23,5	32,3	24,8	8,7	1,7	0,1
United Arab Emirates	3,1	12,7	25,1	25,7	19,2	10,4	3,2	0,5
United Kingdom	0,7	4,8	14,3	26,6	26,5	18,2	7,3	1,6
United States	0,8	4,7	15,8	24,1	26,2	19,5	7,3	1,5
Uruguay	2,3	11,8	27,6	30,2	20,1	7,0	1,0	0,0
Uzbekistan	4,9	30,9	45,8	16,6	1,8	0,1	0,0	0,0
Viet Nam	0,4	3,3	17,7	35,5	31,7	10,2	1,2	0,1

Male students

	Below 1b	Level 1b	Level 1a	Level 2	Level 3	Level 4	Level 5	Level 6
Lebanon	10,6	17,9	26,2	25,5	14,3	4,8	0,7	0,0
OECD average	1,2	6,8	17,5	24,4	24,5	17,2	6,9	1,4
Albania	9,3	30,7	33,7	18,2	6,2	1,7	0,2	0,0
Argentina	3,5	17,5	31,4	27,3	14,9	4,7	0,7	0,0

Australia	1,1	5,4	13,9	21,1	23,9	20,5	10,6	3,4
Austria	0,7	5,6	15,3	22,4	26,8	19,8	8,0	1,4
Baku (Azerbaijan)	6,6	27,4	34,6	21,5	8,3	1,6	0,1	0,0
Belgium	0,9	6,5	16,0	23,2	25,9	19,4	7,2	1,0
Brazil	5,4	19,4	29,5	24,5	14,1	5,5	1,3	0,2
Brunei Darussalam	2,0	12,5	26,3	26,6	19,8	10,0	2,6	0,1
Bulgaria	3,9	19,3	29,2	23,3	16,0	6,7	1,5	0,1
Cambodia	5,8	39,2	45,0	9,3	0,7	0,0	0,0	0,0
Canada	0,6	3,8	11,9	21,6	27,2	21,9	10,0	3,0
Chile	1,8	9,6	23,0	28,9	23,4	10,9	2,2	0,1
Chinese Taipei	0,6	3,1	9,7	16,3	23,9	26,5	15,3	4,5
Colombia	3,0	15,9	31,2	28,3	15,5	5,2	0,9	0,0
Costa Rica	2,1	13,7	31,5	31,7	15,8	4,5	0,6	0,0
Croatia	0,7	5,8	18,5	28,6	25,7	15,4	4,8	0,6
Cyprus	8,4	23,6	26,2	19,6	13,9	6,4	1,6	0,2
Czech Republic	0,7	4,6	15,8	24,5	26,0	18,6	7,9	1,7
Denmark	0,5	4,1	15,1	25,4	27,5	19,0	7,0	1,5
Dominican Republic	7,9	34,7	36,4	16,6	4,0	0,4	0,0	0,0
El Salvador	5,1	26,4	38,8	20,9	7,5	1,2	0,1	0,0
Estonia	0,1	1,9	9,3	22,0	30,4	24,4	10,0	1,9
Finland	1,0	5,8	15,2	22,2	24,8	19,5	8,8	2,8
France	1,3	7,5	17,0	22,4	24,7	18,3	7,6	1,3
Georgia	6,2	26,5	35,7	20,8	8,1	2,5	0,3	0,0
Germany	1,2	7,0	15,6	23,5	23,9	18,4	8,4	2,1
Greece	2,5	12,6	25,1	28,7	20,6	8,7	1,8	0,0
Guatemala	3,1	24,2	43,5	23,8	4,9	0,5	0,0	0,0
Hong Kong (China)	0,3	3,1	10,7	20,5	27,9	25,3	10,4	1,7
Hungary	0,7	5,8	16,9	25,0	25,9	18,6	6,3	0,8
Iceland	2,5	12,1	24,5	27,3	21,5	9,9	2,0	0,1
Indonesia	4,0	22,5	40,7	25,0	6,9	0,9	0,0	0,0
Ireland	0,4	3,6	12,1	24,3	28,7	21,4	8,4	1,1
Israel	3,6	12,0	18,8	20,5	21,4	16,2	6,2	1,3

Italy	1,1	6,4	17,3	24,6	27,6	17,6	4,8	0,5
Jamaica	6,8	23,3	29,6	22,7	11,8	4,8	1,0	0,0
Japan	0,1	1,7	7,4	16,5	25,9	28,4	16,3	3,7
Jordan	7,5	32,4	37,2	18,0	4,4	0,5	0,0	0,0
Kazakhstan	1,7	11,9	34,0	31,6	14,8	4,8	1,0	0,1
Korea	1,4	3,9	10,0	17,6	25,8	24,3	13,7	3,3
Kosovo	5,7	36,9	37,7	15,5	3,8	0,3	0,0	0,0
Latvia	0,3	2,8	14,5	28,6	29,6	18,3	5,4	0,6
Lithuania	0,6	5,5	17,9	27,7	26,4	15,7	5,2	1,0
Macao (China)	0,2	1,5	6,8	16,3	29,3	29,3	14,2	2,5
Malaysia	1,9	16,9	33,6	29,1	14,0	3,7	0,6	0,1
Malta	2,1	10,9	20,5	24,2	23,0	14,4	4,2	0,6
Mexico	1,8	13,0	31,9	33,6	16,4	3,2	0,1	0,0
Moldova	2,5	16,3	32,3	27,5	15,9	5,0	0,5	0,0
Mongolia	2,2	16,3	35,6	29,8	13,2	2,7	0,2	0,0
Montenegro	3,7	20,5	33,7	24,7	13,3	3,7	0,4	0,0
Morocco	5,2	33,1	38,7	18,1	4,5	0,4	0,0	0,0
Netherlands	1,2	7,8	18,7	21,0	21,1	18,6	9,5	2,0
New Zealand	1,2	6,0	14,9	21,0	24,1	19,4	10,6	2,9
North Macedonia	6,9	28,4	33,6	21,0	8,3	1,6	0,2	0,0
Norway	2,0	10,0	19,0	22,9	22,3	16,3	6,1	1,3
Palestinian Authority	8,4	34,7	36,7	15,7	3,9	0,6	0,0	0,0
Panama	6,1	22,8	33,1	23,3	10,9	2,9	0,7	0,1
Paraguay	7,3	27,9	34,5	21,8	7,3	1,2	0,0	0,0
Peru	3,1	15,9	30,4	28,2	16,6	5,0	0,8	0,0
Philippines	9,6	39,7	31,2	13,3	4,9	1,1	0,2	0,1
Poland	0,5	5,1	15,0	23,4	26,7	20,1	8,0	1,3
Portugal	0,7	5,0	17,5	27,0	26,7	17,6	5,0	0,5
Qatar	3,0	17,0	29,7	24,7	15,2	7,7	2,4	0,3
Romania	3,5	16,0	26,1	25,0	18,7	8,8	1,8	0,1
Saudi Arabia	3,0	23,0	40,7	25,0	7,3	1,1	0,1	0,0
Serbia	1,6	10,6	24,9	28,8	21,5	9,8	2,5	0,3

Singapore	0,2	1,5	6,4	13,7	22,5	28,9	20,1	6,6
Slovak Republic	2,6	9,4	20,5	26,5	23,0	13,4	4,0	0,6
Slovenia	0,5	4,6	16,0	26,3	26,5	18,1	6,9	1,2
Spain	0,7	4,9	16,0	26,4	28,8	17,3	5,2	0,7
Sweden	1,7	7,5	17,5	21,2	22,9	18,3	8,7	2,2
Switzerland	0,5	4,4	15,4	23,3	24,9	20,9	8,9	1,7
Thailand	3,0	18,2	35,4	25,2	13,3	4,2	0,6	0,1
Türkiye	0,6	5,6	20,3	28,6	25,5	14,8	4,3	0,3
Ukrainian regions	1,4	10,1	24,1	28,2	23,0	10,8	2,3	0,2
United Arab Emirates	5,7	18,7	24,6	20,8	16,2	9,9	3,5	0,6
United Kingdom	0,7	5,1	14,5	22,0	26,3	20,1	8,8	2,4
United States	1,3	6,4	14,8	20,7	23,4	20,3	10,2	2,9
Uruguay	2,1	11,9	25,3	28,4	21,1	9,1	1,9	0,1
Uzbekistan	7,1	34,0	39,5	16,4	2,7	0,2	0,0	0,0
Viet Nam	0,6	4,0	16,1	33,2	30,6	13,0	2,3	0,2

Table I.B1.4.5. Socio-economic status and science performance

	ESCS quarter			
	Bottom quarter	Second quarter	Third quarter	Top quarter
Lebanon	365	382	404	431
OECD average	442	473	501	538
Albania	359	369	372	407
Argentina	374	391	413	450
Australia	459	489	526	561
Austria	429	477	517	553
Baku (Azerbaijan)	356	378	384	409
Belgium	433	471	513	552
Brazil	366	388	404	457
Brunei Darussalam	406	424	451	503
Bulgaria	367	406	437	477

Cambodia	345	345	345	353
Canada	479	506	530	552
Chile	410	436	450	489
Chinese Taipei	489	526	547	590
Colombia	376	398	414	465
Costa Rica	m	m	m	m
Croatia	450	470	488	525
Cyprus	375	402	423	456
Czech Republic	437	490	510	556
Denmark	452	482	513	532
Dominican Republic	340	349	361	393
El Salvador	347	361	374	414
Estonia	490	512	536	567
Finland	470	495	527	559
France	429	469	506	551
Georgia	352	371	395	424
Germany	443	481	507	564
Greece	404	426	450	486
Guatemala	350	362	375	405
Hong Kong (China)	498	517	521	549
Hungary	424	468	506	549
Iceland	403	442	460	486
Indonesia	370	377	384	402
Ireland	467	490	518	545
Israel	407	447	490	526
Italy	434	470	487	522
Jamaica	381	398	407	441
Japan	511	538	558	582
Jordan	357	368	373	403
Kazakhstan	406	415	424	448
Korea	486	516	539	573
Kosovo	344	348	355	383

Latvia	461	481	503	533
Lithuania	444	468	499	532
Macao (China)	526	542	543	561
Malaysia	385	402	417	463
Malta	422	454	480	514
Mexico	379	398	414	447
Moldova	382	403	421	463
Mongolia	376	397	419	459
Montenegro	370	393	411	441
Morocco	356	357	357	392
Netherlands	441	465	512	551
New Zealand	453	498	529	559
North Macedonia	348	368	386	423
Norway	436	469	495	526
Palestinian Authority	346	364	371	397
Panama	345	370	391	445
Paraguay	346	354	364	412
Peru	367	395	415	456
Philippines	335	353	351	386
Poland	455	487	513	549
Portugal	445	468	492	537
Qatar	389	419	457	473
Romania	370	409	438	493
Saudi Arabia	372	379	398	415
Serbia	411	437	457	488
Singapore	504	547	586	611
Slovak Republic	390	453	479	527
Slovenia	455	485	517	546
Spain	448	473	495	527
Sweden	441	476	515	553
Switzerland	447	486	519	567
Thailand	388	394	403	453

Türkiye	447	462	475	520
Ukrainian regions	408	435	462	489
United Arab Emirates	386	431	464	457
United Kingdom	466	490	507	558
United States	451	480	510	559
Uruguay	396	421	439	490
Uzbekistan	347	350	355	367
Viet Nam	446	463	477	503