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Investigating the determinants of the Quality Evaluation Scores as indicators of students' learning achievement of Senior High School at district/city in Indonesia

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Abstract
This study aims to analyze the determinants of the Quality Evaluation scores (NEM) of Senior High Schools (SMA) at the district/city level in Indonesia. NEM is one of the indicators of student learning achievement that can reflect the quality of education in a region. This study uses secondary data sourced from the Central Statistics Agency (BPS), the Ministry of Education and Culture, and other related agencies. The analysis method used is multiple linear regression to identify factors that significantly influence the variation in the average NEM between regions. The independent variables analyzed include teacher education level, student-to-teacher ratio, proportion of A-accredited schools, human development index (HDI), and poverty level. The results of the study indicate that the quality of educators and school accreditation factors have a significant positive effect on the NEM score, while the poverty level is negatively correlated. These findings provide important implications for the formulation of more equitable and data-based education policies to improve the quality of education throughout Indonesia. The study's use of secondary data from reputable government sources enhances the reliability of its findings. The multiple linear regression analysis provides a robust framework for identifying key factors influencing regional variations in average NEM scores. The significant positive effects of educator quality and school accreditation, coupled with the negative impact of poverty, underscore the importance of addressing both educational and socioeconomic factors in policy formulation.
Keywords: NEM, learning achievement, quality of education, district/city, Indonesia.

INTRODUCTION

Average national exam scores at the secondary education level vary significantly across countries and contexts, reflecting inequalities in the quality and access to education. For example, in Romania, the average score on the National Evaluation exam was significantly lower than the average score obtained during the lower secondary education cycle, indicating a concerning trend in educational outcomes (Ceban et al., 2023). In the Philippines, students enrolled in the Kumon Mathematics Program achieved an average percentage score of 70.03 on the National Achievement Test, indicating that additional educational programs can improve performance (Mendaje, 2018). In Brazil, a study identified that various socioeconomic factors have a significant influence on mathematics achievement, with one model explaining almost 30% of the variation in scores (Gomes et al., 2020)."

Several factors influence average national exam scores at the secondary education level. These factors include:

1. Socioeconomic Status

Socioeconomic status plays a significant role in determining student performance. Students from low-income families often face challenges such as limited access to quality education, fewer resources, and less support at home, which can negatively impact their exam scores. For example, a study in Brazil found that students from families with a monthly income equal to or less than two minimum wages performed significantly worse on math exams (Gomes et al., 2020).

2. Geographical Location

Geographical location is also a crucial factor. Students from urban areas often have better access to quality education, experienced teachers, and resources compared to their peers in rural areas. A study in Romania highlighted that rural students consistently perform lower than urban students on national exams, highlighting the need for targeted interventions to bridge this gap (Ceban et al., 2023).

3. Gender Differences
Gender differences also affect exam performance. A study in Brazil found that female students performed worse on math exams than their male counterparts (Gomes et al., 2020). This suggests the need for gender-sensitive policies to address disparities in educational outcomes.
4. School Type
The type of school a student attends can also affect their performance. For example, students attending private schools often perform better than students attending public schools due to better infrastructure, qualified teachers, and more resources. A study in Brazil found that students attending private schools at both the primary and secondary levels performed better on exams (Gomes et al., 2020).
5. Motivation and Goals
A student's motivation and goals can also affect exam performance. A study in Brazil found that students who were highly motivated to excel on exams with the goal of to obtain a secondary education certificate or scholarship, actually showed worse results compared to students with other motivations (Gomes et al., 2020; Ansari et al., 2023). This suggests that intrinsic motivation may be more effective in driving academic success than external factors.

Previous studies in Indonesia have widely examined the National Examination Scores as a benchmark for assessing students' academic performance and educational outcomes. These evaluations are often correlated with cognitive abilities, school resources, and teacher qualifications. Some research has also focused on regional disparities and socio-economic influences on student performance. However, these studies generally treat NEM as a static outcome rather than a dynamic indicator shaped by multiple determinants within the educational ecosystem

Despite the relevance of NEM in policy-making and school evaluation, current research often relies on macro-level or national-level data, lacking granularity at the district or city level. As a result, the nuanced local determinants—such as specific educational policies, governance quality, school leadership, and community involvement—remain underexplored. Furthermore, studies frequently emphasize input factors (e.g., infrastructure, funding) without adequately accounting for process and context factors (e.g., teaching practices, student engagement, or parental involvement) that influence learning outcomes.

There is a noticeable gap in multivariate studies that comprehensively examine how various school-level, teacher-level, and student-level variables jointly influence NEM outcomes. Moreover, the diversity in educational contexts across Indonesian districts and cities—urban vs. rural, rich vs. poor, developed vs. underdeveloped regions—is often overlooked. This leads to an oversimplified understanding of NEM determinants, ignoring how localized educational policies, teacher deployment, and socio-cultural environments affect learning achievement differently across regions.

To inform targeted policy interventions and school improvement strategies, there is a critical need for context-specific research that investigates the determinants of NEM at the district/city level. Such research should integrate quantitative analyses of diverse variables with an understanding of the local educational context to uncover actionable insights. Addressing this gap can provide policymakers, educators, and stakeholders with clearer evidence on what drives students' academic success, and how quality evaluation scores can better reflect true learning achievement.

THEORETICAL REVIEW

The influence of teacher pedagogical competence in national examinations in Senior High Schools in Mojekerto State Senior High School. The results obtained are as follows (1) the level of teacher pedagogical competence is in the very good category with an average value of 86.75% (2) the level of teacher work motivation is in the very good category with an average value of 86% (3) student learning achievement in the national examination is in the very good category with an average value of 81% (4) the variable of teacher pedagogical competence partially influences the variable of learning achievement with a total value of 3.014 (5) the variable of teacher work motivation partially influences the variable of learning achievement with a total value of 4.246 (6) the variables of teacher pedagogical competence and work motivation simultaneously influence the variable of student learning achievement with a total value of 13.318. This shows that the high level of teacher pedagogical competence and work motivation together will provide a real contribution to student learning achievement in the National Examination.

The results of this study indicate that parental income, parental education, and average UN scores have a significant effect on the tendency of students to continue their studies with a 95% confidence level. However, with a 99% confidence level, the average UN score no longer has a significant effect. The conclusion of this study shows that students with parental income of more than two million rupiah and parental education of at least a diploma tend to continue their studies, while UN scores have an effect but are not significant (Sugama Maskar V. H. S)

The effect of regional education spending on access to education at the secondary level at the Regency/City level, not all citizens have equal access to education, even though according to the constitutional mandate the government must prioritize the education budget of at least 20 percent, both from the APBN and APBD. Along with the growth in education spending, statistical data shows that the Human Development Index (HDI) in Indonesia has increased from 2010-2015, although this index is still relatively low at the international level. This study was conducted to determine the effect of education spending on access to basic and secondary education (SD, SMP, and SMA) at the district/city level. The method used in this study is the panel data method based on the theoretical model of Human Capital Investment. Based on the analysis, the results show that local government spending in the field of education and regional/island characteristics affect access to education. Per capita income has a positive effect on the net participation rate of SMP and SMA. Meanwhile, health spending per student shows a significant negative effect on the net participation rate of SMA.

RESEARCH METHODS

Data

Table 1. Variables, N, Minimum, Maximum, Mean, and Standard Deviation

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Average National Exam Score: Senior Secondary Level (out of 100, available only in district level for 2009)	440	59.54	81.79	70.9854	4.59129
Household Access to Electricity: Total (in % of total household)	440	42	100.00	84.7060	19.57118
Net Enrollment Ratio: Senior Secondary (in %)	440	4.44	8635.00	46.611636	1312.68359
Number of Teacher: Senior Secondary Level (in number of people, 2009 data only)	439	2.00	7782.00	810.7836	935.49699
Valid N (listwise)	329				

Source : Indodapoer, Bank Data (2025)

MODELING

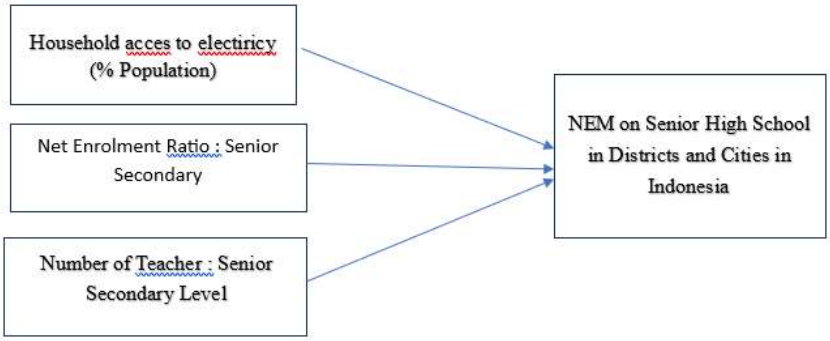

Figure 1. Modelling of the design

The model used in this study is linear multinomial regression.

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 . X_3$$

Y = NEM on Senior High School in Districts and Cities in Indonesia
X1= Household acces to electiricy (% Population)
X2: Net Enrolment Ratio senior Secondary
X3 :Number of Teacher Senior Secondary Level

RESULTS AND DISCUSSION

Table 2. Dependent Variable: Average National Exam Score: Senior Secondary Level

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	59.520	.891		66.791	.000
	Household Access to Electricity: Total (in % of total household)	.110	.011	.463	10.035	.000
	Net Enrollment Ratio: Senior Secondary (in %)	.001	.000	.134	3.162	.002
	Number of Teacher: Senior Secondary Level (in number of people, 2009 data only)	.034	.015	.098	2.257	.024
a. Dependent Variable: Average National Exam Score: Senior Secondary Level (out of 100, available only in district level for 2009)						

Based on the data analysis, the researchers found that:

1. Every increase of one unit in this case 1% of the population connected to electricity increases the NEM of high schools by 0.11.
2. Every increase of one high school teacher affects the increase in NEM by 0.001.
3. Every increase of 1% in the ratio of high school entrance affects the increase of 0.034 in the NEM of high schools in Regency / City in Indonesia

This study aimed to investigate the key determinants influencing the Quality Evaluation Scores (QES) as indicators of student learning achievement across senior high schools in various districts and cities in Indonesia. The findings reveal that several interrelated factors significantly affect the QES, including school infrastructure, teacher competence, socioeconomic background, and governance quality. These

results are consistent with previous national and international studies, reaffirming the complexity and multi-dimensional nature of educational outcomes.

One of the most significant determinants identified is the level of teacher competence. Schools with more certified, experienced, and pedagogically trained teachers consistently reported higher QES. This finding underscores the vital role of teaching quality in shaping student learning outcomes. Moreover, teacher professional development and the availability of subject-specific training appear to enhance not only instructional delivery but also student engagement, which in turn improves performance on standardized assessments used in quality evaluations.

Another critical determinant is the socioeconomic status (SES) of students and their families. Districts with higher average household income, better parental education levels, and more stable employment rates tend to perform better in QES metrics. This suggests that students from more affluent or educated backgrounds have access to additional resources such as private tutoring, learning materials, and a conducive home environment, all of which support their academic success. This SES disparity highlights the need for more equitable educational policies that can bridge these systemic gaps.

Infrastructure and learning facilities also showed a strong correlation with QES. Schools with adequate classrooms, laboratories, libraries, and access to digital technologies scored higher on quality evaluations. This demonstrates the importance of physical and technological readiness in supporting quality education. In some remote or underdeveloped areas, lack of infrastructure remains a significant barrier, which may lead to disparities in educational achievement across regions. Ensuring equitable infrastructure investment is therefore a critical policy implication.

Governance and school management practices further emerged as a determinant of educational quality. Well-managed schools with transparent planning, community involvement, and robust evaluation systems often had better QES. These findings align with the principles of school-based management (SBM) promoted by the Indonesian Ministry of Education. Effective leadership appears to directly influence teacher morale, student discipline, and curriculum implementation, all of which contribute to improved learning outcomes.

Interestingly, regional differences also reflect the uneven distribution of resources and development in Indonesia. Urban districts generally outperform rural counterparts in QES, which may be attributed to better infrastructure, more experienced educators, and greater policy support. This regional inequality points to the necessity of a more nuanced and location-sensitive approach in education planning and funding, particularly to uplift schools in disadvantaged regions.

In conclusion, the findings highlight the multifaceted nature of student achievement as reflected in Quality Evaluation Scores. Addressing the disparities in teacher quality, infrastructure, socioeconomic support, and school governance is essential to improving education outcomes across Indonesia. Policymakers must take an integrated approach, ensuring that interventions target both academic and contextual factors that shape learning achievements in different district and city settings.

Referring to the results depicted, the researchers recommended

1. If Indonesia wants to increase NEM, in this case the government needs to strengthen educational infrastructure in areas that still lack access to electricity to support a better learning process.
2. The government must and needs to increase the number and quality of high school teachers by providing training and equal distribution throughout Indonesia is very important to get good educational results.
3. The government or community needs to increase the Net enrollment ratio of high schools in regencies/cities in Indonesia to increase the NEM of high schools.
4. The government must pay attention to equitable access to education including policies that increase participation rates, especially in rural areas.

CONCLUSION

This study shows that there is a significant relationship between several factors and the average national exam score (NEM) at the high school level in Indonesia. Based on the results of the analysis, several important findings can be concluded:

1. Access to Electricity: Every 1% increase in the proportion of the population connected to electricity in an area will cause an increase in the NEM of high schools by 0.11 points. This shows that access to electricity plays an important role in supporting the quality of education, where areas with better access to electricity tend to have better educational facilities, as well as students' ability to learn optimally, both during the day and at night.
2. Number of Teachers: Every additional one high school teacher in an area will increase the NEM of high schools by 0.001 points. Although this effect is small, it still shows the importance of an adequate number of teachers in each school, which has an impact on the quality of teaching and students' understanding of the subject matter.
3. High School Entrance Ratio: Every 1% increase in the participation ratio of high school entrance has an effect on an increase of 0.034 points in the NEM of high schools. This suggests that the increase in the number of students continuing their education to senior high school, which may reflect public awareness of the importance of education, has contributed to the improvement in national exam results at the senior high school level. Overall, the results of this analysis confirm that basic infrastructure factors, such as access to electricity, as well as other educational factors, such as the number of teachers and student participation ratio, have a positive effect on educational achievement at the senior high school level in Indonesia. Therefore, to improve the quality of education, interventions are needed that focus more on improving basic infrastructure and providing adequate human resources in the education sector.

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