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A Retrospective Causal-Comparative Study on the Influences of Household Demographics, Technological Access, and Economic Factors on Regional Basic and Functional Literacy Rates in the Philippines

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A B S T R A C T

Literacy is crucial for navigating everyday life, yet despite national efforts, gaps remain in understanding how household demographics, technological access, and economic factors influence regional basic and functional literacy rates in the Philippines. Thus, this inquiry examined the influences of various factors employing a retrospective causal-comparative design, using secondary data from official government sources such as the Philippine Statistics Authority (PSA). Kendall's tau (τ) correlation and multiple regression analysis with a stepwise data entry method were employed. Results revealed that household access to electricity, ICT devices, email/ research, social media, and household final consumption expenditure are significantly and positively correlated with regional literacy rates. Conversely, poverty incidence, average annual family income, and families with a cable subscription were negatively correlated. Meanwhile, poverty incidence, access to email and research, television ownership, and regional competitiveness scores are significant predictors of literacy rates. Notably, the current investigation developed a policy recommendations and advocates for a multi-sectoral approach involving education agencies and government departments, including community stakeholders. Recommendations include expanding access to essential utilities, increasing household spending and income opportunities, leveraging technology in literacy, and enhancing regional competitiveness to foster nationwide literacy improvements. Future scholarly work may use the updated basic and functional literacy data and other factors as they become available, including the health index, human development index, and government social protection programs.

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RESUMO

A alfabetização é crucial para a navegação na vida cotidiana, no entanto, apesar dos esforços nacionais, ainda existem lacunas na compreensão de como a demografia familiar, o acesso à tecnologia e os fatores econômicos influenciam as taxas regionais de alfabetização básica e funcional nas Filipinas. Assim, esta investigação examinou as influências de diversos fatores empregando um desenho causal-comparativo retrospectivo, utilizando dados secundários de fontes oficiais do governo, como a Autoridade de Estatísticas das Filipinas (PSA). Foram empregadas a correlação de Kendall tau (τ) e a análise de regressão múltipla com um método de entrada de dados stepwise. Os resultados revelaram que o acesso das famílias à eletricidade, dispositivos de TIC, e-mail/pesquisa, redes sociais e o consumo final das famílias são significativamente e positivamente correlacionados com as taxas regionais de alfabetização. Por outro lado, a incidência de pobreza, a renda familiar média anual e as famílias com assinatura de TV a cabo estavam negativamente correlacionadas. Enquanto isso, a incidência de pobreza, o acesso a e-mail e pesquisa, a posse de televisão e os índices de competitividade regional são preditores significativos das taxas de alfabetização. Notavelmente, a investigação atual desenvolveu um marco de políticas e defende uma abordagem multi-setorial envolvendo agências educacionais e departamentos governamentais, incluindo partes interessadas da comunidade. As recomendações incluem expandir o acesso a serviços essenciais, aumentar os gastos e oportunidades de renda das famílias, aproveitar a tecnologia na alfabetização e melhorar a competitividade regional para incentivar melhorias na alfabetização em todo o país. Trabalhos acadêmicos futuros podem utilizar os dados atualizados de alfabetização básica e funcional e outros fatores à medida que se tornem disponíveis, incluindo o índice de saúde, o índice de desenvolvimento humano e os programas de proteção social do governo.

Keywords:
alfabetização básica, factores económicos, alfabetización funcional, demografía local, acceso a tecnología

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Introduction

In today's society, profound literacy abilities are crucial for performing routine tasks such as reading and writing, understanding official documents, interpreting public information, and communicating effectively in personal and professional settings. Without these skills, individuals may struggle to participate fully in economic, social, and civic activities. According to UNESCO (2025), literacy is defined as proficiency in reading, writing, and using numbers. It also encompasses broader skills, including media literacy, digital competence, global citizenship, and sustainable development education. Additionally, Brown (2014) argues that the quality of early education is crucial to students' academic success, and learners must understand the importance of reading and writing to become more motivated, which will eventually help them develop literacy skills independently. Meanwhile, in a systematic review by Rahmania et al. (2024), the authors concluded that numeracy and literacy skills are mutually related and are essential across various subjects such as Mathematics, Science, Chemistry, Biology, and other disciplines.

Moreover, literacy is integrated into education across the curriculum. Therefore, it can be inferred that literacy is consistently developed from early childhood to adulthood. However, several challenges were noted in classroom education, such as developing teaching materials and strategies that effectively integrate literacy skills.

Santillan (2023) identifies several factors that hinder literacy development, including limited parental involvement, a high incidence of malnutrition, an imbalanced teacher-to-pupil ratio, insufficient reading and numeracy intervention programs, and a lack of access to reading materials. These suggest that literacy is affected by various household sociodemographic and school-related factors. Similarly, the World Literacy Foundation (2024) reported that in developing countries, the number of students lacking basic foundational literacy skills continues to rise by 20% annually. This persistent issue contributes to a cycle in which young populations face increased challenges related to poverty and unemployment. These issues were also highlighted by the World Population Review (2025), which reported the association between poverty and illiteracy.

Moreover, even when children from disadvantaged families have access to formal education, they are often compelled to start working at an early age to earn money instead of attending school. Similarly, the Organisation for Economic Co-operation and Development (OECD) reported the variation in science literacy based on the 2022 Programme for International Student Assessment results. Specifically, socio-economically disadvantaged learners are more likely to obtain a score below the baseline of proficiency in science (Level 2) compared to their advantaged peers across OECD countries. Meanwhile, the performance gap between males and females was not statistically significant.

Aside from student literacy, adult literacy and numeracy skills have significantly declined or stagnated over the past decade in most OECD countries, according to the second Survey of Adult Skills (OECD, 2024). Notably, the reduction has been even more evident and widespread among adults with lower levels of education. Moreover, the adult population with higher literacy levels tends to have higher wages and employment, good health conditions, volunteer engagement, high efficacy, and trust in politics.

Furthermore, a large proportion of the adults score at the two lowest levels of proficiency in literacy (26%), numeracy (25%), and adaptive problem-solving (29%), on average, across OECD countries. Data also revealed that those aged 55 to 65 demonstrate lower proficiency than younger adults. Conversely, higher proficiency levels were recorded among adults aged 25 to 34, followed by those aged 16 to 24. Interestingly, Noreen and Iqbal (2024) reported several challenges affecting adult literacy participation, including limited encouragement and engagement, unattractive and irrelevant literacy content, inadequate teacher training and evaluation mechanisms, and ineffective presentation methods.

With several issues with literacy among young people and adults, many strategies have been developed and incorporated into education. In the review of Judijanto (2025), various approaches are highlighted for improving literacy. Specifically, access to education should be the priority, which includes providing instructional material, equipment, facilities, and professional development for educators. Additionally, the curriculum should be responsive to the needs of students from different socioeconomic and cultural backgrounds.

The author emphasized the importance of strengthening early childhood literacy, as it plays a vital role in students' overall development. On the other hand, the Institute of Education Science (n.d.) provided a practical guide in enhancing literacy outcomes using evidence-based programs and practices.

Notably, the literacy roadmap offers school leaders and educational stakeholders a structured approach to improving literacy by first considering local needs, selecting relevant evidence-based practices, planning for implementation, executing the plan, and conducting evaluation and reflection. Furthermore, the qualitative study by Asykur et al. (2022) highlights that improvements in literacy can be achieved by implementing the following: use of rewards and punishments, development of teacher competence, the use and mastery of educational technologies, library visits, and a strong focus on both the learning process and outcomes. While global trends provide a valuable benchmark, it is equally important to understand the local dynamics that uniquely affect literacy in the Philippines.

Basic Literacy and Functional Literacy in the Philippines

On the latest available data from the Program for International Student Assessment (PISA) in 2022, results revealed that the country ranked 76th out of 81 countries in reading comprehension, 76th in mathematics, and 77th in science (OECD, 2023a; OECD, 2023b). This

suggests a consistent challenge in literacy and this result is comparable to those in PISA 2018. Similar to the report of the World Bank (2019), the country has increased its spending on education; however, the results of the National Achievement Test (NAT) have remained stagnant over time. On the other hand, the Philippine Statistics Authority (PSA), formerly the National Statistics Office (NSO), led the Functional Literacy, Education, and Mass Media Survey (FLEMMS) to provide comprehensive insights on the situation of literacy in the country. The PSA administered the survey in 1989, 1994, 2003, 2008, 2013, 2019, and 2024 to promote educational reforms and eliminate illiteracy nationwide.

According to the FLEMMS definitions in 2019, *"basic literacy is the ability of the individual to read and write with an understanding of a simple message in any language or dialect".* On the other hand, *"functional literacy refers to a higher level of literacy and focuses on reading and writing, including numeracy skills. These skills must be advanced enough to enable individuals to effectively and independently engage in everyday activities requiring communication."*

Generally, the administration of FLEMMS aims to determine the proportion of the population aged 10 and above who are literate and those aged 10 to 64 who are functionally literate. Interestingly, in 2024, the Philippine Statistics Authority published the recent results of the FLEMMS, and the definitions of basic and functional literacies were revised. Specifically, basic literacy is defined as the ability to read and write, similar to 2019, but it includes the skills of computing or performing basic mathematical operations.

Meanwhile, functional literacy refers to a person's ability to read, write, compute, and comprehend. Beyond basic literacy skills, functional literacy involves advanced comprehension abilities, such as integrating multiple information and drawing inferences. Out of 54,340 selected sample households, 41,686 were eligible for interview. Of these, 40,727 household interviews were successfully conducted, resulting in a response rate of 97.7%. Meanwhile, 119,818 individuals aged 10 to 64 were surveyed, and 113,617 are illegible with a response rate of 94.8%. Generally, the data revealed that 90% of those aged 5 years and over had basic literacy.

However, illiteracy rates are highest among children aged 5 to 9. Across all regions in the Philippines, the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) had the highest illiteracy rate (14.4%) among individuals aged five and older. Meanwhile, the 20 to 24-year-old age group demonstrates the highest functional literacy rate. Moreover, variations on regional literacy rates were observed in 2024, similar to the 2019 results. This suggests that although the literacy rate generally improves, some regions struggle to achieve higher literacy rates.

Furthermore, Gatcho and Gutierrez (2018) report that the perennial problem during adolescence and adulthood is focused on reading and literacy skills. These skills remain a primary focus of the government, as preparing young students to comprehend and generate

knowledge from various sources across disciplines. Meanwhile, the qualitative study of Kilag et al. (2024) highlights that insufficient teacher training, challenges in implementing effective instructional strategies, and limited resources hinder literacy development. Building upon the challenges outlined in the literature, it becomes imperative to explore the underlying factors influencing literacy outcomes. Therefore, understanding these variables can provide a more comprehensive view of the literacy landscape in the Philippines.

Additionally, Abella et al. (2024) and Echavez et al. (2024) emphasize that analyzing the foundational roles of literacies and socioeconomic disparities could reveal the crucial relationships and consequently inform the development of targeted interventions to promote higher literacy in the Philippines. Notably, several investigations have been conducted to assist the Philippine government in identifying targeted solutions for the challenges using the available data in the large-scale assessments, such as the PISA and FLEMMS, to improve the population's literacy and education outcomes.

However, existing research has not sufficiently examined the relationships between regional household demographics, technological access, and economic factors on basic and functional literacy rates. Likewise, the updated household and other technology-related demographics for 2023 or 2024 from the Philippine Statistics Authority (PSA) were unavailable to determine relationships to regional literacy rates in the current 2024 FLEMMS. Despite global and national efforts, gaps remain in understanding how regional household demographics, technological access, and economic factors influence literacy outcomes, particularly in the Philippine context.

Given these multifaceted issues, this scholarly work examines the relationships between regional literacy rates and key household demographics, technological access, and socio-economic factors using the 2019 publicly available datasets from the Philippine Statistics Authority and other government official websites. In doing so, it seeks to fill a critical gap in the literature by identifying how the variables contribute to consistent variations in regional literacy. The findings are expected to inform policy recommendations aligning with national education reforms and international commitments to inclusive, equitable, and quality education for all.

Research Questions

The following research questions were formulated to guide the investigation. Is there a significant correlation between the household-related socio-demographics and the regional basic and functional literacy rates? Is there a significant correlation between the technology-related demographics and the regional basic and functional literacy rates? Is there a significant correlation between the economic factors and the regional basic and functional literacy rates? What are the significant predictors of regional basic and functional literacy rates? What policy

recommendations may be developed from the regression models to achieve higher regional basic and functional literacy rates in the Philippines?

Methodology

Using a retrospective design, this investigation examined the relationships of basic literacy and functional literacy across various factors. According to Monaco (2013), a retrospective study is one in which the outcomes have already occurred by the time the research begins. Specifically, this study employed a retrospective comparative causal approach to identify the causes or effects of existing differences among regional literacies. Moreover, this study is also called ex post facto research design, which involves analyzing a specific question after the outcomes have occurred to determine whether one variable has influenced another. In brief, this study is appropriate because the investigation began after the relevant events or data had already been collected from a reputable source, such as government surveys and statistical data, without any interference from the researcher.

In the context of social research, it is often impractical or unethical to manipulate participant characteristics. Therefore, an ex post facto design was employed as a substitute for an experimental study to test hypotheses about cause-and-effect relationships (Silva, 2010). Notably, this investigation utilized the procedure outlined by Isaac and Michael (1971), in which the study begins by defining the problem, reviewing related literature, and stating the hypotheses. Furthermore, the researcher created a list of assumptions for the study, followed by designing the research approach. This includes selecting suitable participants and materials, choosing or creating data collection tools, and establishing clear, relevant data classification categories. Notably, the data-gathering techniques were validated for reliability. Lastly, the findings were described, analyzed, and interpreted using clear and precise language.

Sources of Data

The proponent collected, recorded, analyzed, and interpreted the data from February to May 2025. Primarily, the data used in this investigation were obtained from publicly available information on official government websites in the Philippines. Specifically, the regional data on basic and functional literacy were gathered from the final report of the Philippine Statistics Authority on the Functional Literacy, Education, and Mass Media Survey (FLEMMS) in 2019.

The data were presented and expressed by region and corresponding percentage rates. Moreover, household-related socio-demographic data, including poverty indices and average annual family income for 2018 and 2021, were obtained from the 2023 Philippine Statistical Yearbook (Philippine Statistics Authority, 2023). Due to the unavailability of data for 2019, the nearest possible years, 2018 and 2021, were utilized as substitutes for poverty incidence and annual family income figures. Other demographic data, such as average family size, with

electricity in the house/ building, and the percentage of families that availed a loan from January to June 2019, were obtained from the publicly available document on the 2019 Annual Poverty Indicators Survey (2019 APIS).

On the other hand, the regional percentage data on technology-related demographics, including access to email and research, access to social media, usage of owned ICT devices for learning, and usage of owned ICT devices, were retrieved from the 2019 Functional Literacy, Education, and Mass Media Survey (FLEMMS). Additionally, data related to access to cellular phones, television, personal computers, cable subscriptions, and families who used the internet from January to June 2019 were collected from the 2019 Annual Poverty Indicators Survey (2019 APIS).

Conversely, the data related to economic factors such as per capita household final consumption expenditure (in Philippine peso) and government final consumption expenditure regional growth rates (%) were obtained from the 2019 Gross Regional Domestic Expenditure of the Philippine Statistics Authority infographic, with a reference number of MAS02-RA-20102020 (Philippine Statistics Authority, 2020a). Lastly, the proponent obtained the regional competitiveness scores by computing the average of the provincial scores available on the Cities and Municipalities Competitiveness Index 2019 Rankings published by the Department of Trade and Industry (DTI).

Data Analysis

The data obtained from the documents were tabulated and organized in a Google Sheet, then processed by JASP 0.19.3 for macOS. Moreover, Kendall's tau (τ) correlation analysis was performed to determine if regional household demographics, technological access, and economic factors correlated with basic and functional literacy rates. Notably, this analysis relied on concordant and discordant pairs. It is less sensitive to errors, and the *p*-values it generates tend to be more accurate, particularly with smaller sample sizes.

This analysis is appropriate since the investigation depends on 17 regions in the Philippines that were used as datasets. Furthermore, *p*-values less than .05, .01, and .001 were considered statistically significant, indicating increasing significance levels. The cutoff values used to interpret the rank-based correlation statistics were adopted from Wicklin (2023), based on the study of Schober et al. (2018). Specifically, the strength of the correlation was categorized as follows: negligible (.00-.05), weak (.06-.25), moderate (.26-.48), strong (.49-.70), and very strong (.71-1.00).

Multiple regression analysis using the stepwise method was employed to determine significant predictors of regional basic and functional literacy rates. According to Chen et al. (2024) and Goss-Sampson (2024), the stepwise method is used to select independent variables in linear regression. This approach systematically evaluates predictors by adding a variable at each step and testing whether any previously included variables have become redundant. After each addition, a removal test is performed to determine if any of the least useful predictors can

be excluded from the model. Furthermore, analyses were conducted for each of the following categories: regional household-related socio-demographics, technological access, and economic factors. Moreover, the data were *z*-standardized prior to analysis to ensure comparability across variables. Likewise, the calculation was performed using JASP 0.19.3 for macOS, with the stepping method criteria set to an entry probability of .05 and a removal probability of .1.

Results and Discussion

Correlation between Household-Related Socio-Demographics and Regional Literacy Rates

Generally, this study explored the correlation of regional household-related socio-demographics, technological access, and economic factors on basic and functional literacy in the Philippines. The regional household-related demographics were presented (see Table 1), including the average family size with electricity in the house/ building, percent of families who availed of a loan, poverty incidence among families (2018), poverty incidence among families (2021), average annual family income (2018), and average annual family income (2021).

The results revealed a moderately negative correlation between regional basic and functional literacy rates and average family size; however, these relationships were not statistically significant (τ = -.295, p = .124 for basic literacy; τ = -.329, p = .087 for functional literacy). Additionally, a significant and moderately positive correlation was observed with the percentage of households with access to electricity, τ = .483, p = .007. This data suggests that when there is an increase in household access to electricity, the regional basic literacy rates increases. Notably, this result is supported by the study of Akram (2022), which found that the availability of electricity improves the education sector and enhances quality of life, thereby contributing further to literacy development. Likewise, Capule-Navarro and Alampay (2020) reported that the electrification of schools in the Philippines supports the improvement of performance in the National Achievement Test (NAT).

Data also revealed a significant, moderately negative correlation between regional basic literacy rates and the percentage of families who availed of a loan (τ = -.356, p = .048), suggesting that households experiencing financial strain may face challenges in supporting literacy development. In contrast, while functional literacy exhibited a similarly moderately negative correlation with loan availing (τ = -.341), this relationship was not statistically significant (p = .058), indicating that the trend may exist but lacks sufficient evidence for generalization. In summary, the data were insufficient to explain the variation in regional literacy rates. Nonetheless, Liu and Zhang (2020) found that family savings significantly affect children's academic performance, highlighting the potential influence of financial preparedness on educational outcomes.

Table 1.

Correlation of Regional Literacy Rates and Household-Related Socio-Demographics

Literacy Rate[a]	Household-Related Socio-Demographics	Kendall's tau (τ)	*p*
Basic Literacy (%) 10 years old and over	Average family size	-.295	.124
	With electricity in the house/ building	.483**	.007
	Percent of families who availed of a loan[b]	-.356*	.048
	Poverty incidence among families (2018)	-.533**	.003
	Poverty incidence among families (2021)	-.504**	.005
	Average annual family income (2018)	.563**	.002
	Average annual family income (2021)	.607***	<.001
Functional Literacy (%) 10 to 64 years old	Average family size	-.329	.087
	With electricity in the house/ building	.528**	.003
	Percent of families who availed loan[b]	-.341	.058
	Poverty incidence among families (2018)	-.548**	.002
	Poverty incidence among families (2021)	-.548**	.002
	Average annual family income (2018)	.578**	.001
	Average annual family income (2021)	.622***	<.001

a. Philippine Statistics Authority, Functional Literacy, Education and Mass Media Survey 2019/ Regional Rates
b. Availed from January to June 2019
Sig. (2-tailed): *p <.05, ** p <.01, *** p <.001

Additionally, poverty incidence in 2018 and 2021 was examined to determine its correlation with regional literacy rates; these data were used due to the unavailability of 2019 poverty indicators. According to the Philippine Statistics Authority (2020b), *"poverty incidence refers to the proportion of families or individuals whose per capita income or expenditure falls below the per capita poverty threshold of individuals or families."* Results showed that poverty incidence among families in 2018 and 2021 had a significant and strong negative correlation with regional basic and functional literacy rates.

For basic literacy, the Kendall's tau (τ) coefficients were -.533 (p = .003) in 2018 and -.548 (p = .002) in 2021. For functional literacy, the tau (τ) coefficients were -.548 (p = .002) in 2018 and -.504 (p = .005) in 2021. This suggests that an increase in poverty incidence is

likely associated with a decline in regional basic and functional literacy rates, indicating that higher poverty levels may hinder access to educational opportunities and resources. These results were corroborated by the findings of Gubaten and Abarquez (2024), who reported that poverty consistently affects engagement and motivation, highlighting the need for targeted interventions. Moreover, the authors emphasized the multifaceted challenges faced by students from low-income families, reinforcing the importance of addressing the diverse factors influencing student engagement.

Consistently, De Jesus and Vinoya (2025) reported that an increase in the percentage of poverty incidence among families is associated with a decrease in PISA scientific literacy scores. Similarly, Normandin (2022) argued that poverty can negatively impact physical and cognitive development. Specifically, inadequate education increases the likelihood of poverty, contributing to poor educational outcomes and decision-making. The inequality in opportunities and circumstances perpetuates a complex cycle, which is why many government initiatives have prioritized poverty alleviation as a key strategy for improving educational outcomes (Second Congressional Commission on Education, 2024).

Furthermore, data from 2018 and 2021 were analyzed to examine the relationship between average annual family income and regional literacy rates. The results revealed that average annual family income in 2018 had a significant and strong positive correlation with basic literacy ($\tau = .563$, $p = .002$) and functional literacy ($\tau = .578$, $p = .001$). Similarly, the 2021 data showed even stronger positive correlations with basic literacy ($\tau = .607$, $p < .001$) and functional literacy ($\tau = .622$, $p < .001$). These data suggest regions with higher average annual family income exhibit higher literacy rates across basic and functional domains. Notably, these findings align with Lin and Lv (2017), who found that family income significantly affects children's educational attainment, with higher income levels contributing to improved education outcomes.

The authors also argued that low-income families often face difficulties and tend to have low expectations for their children’s education, prioritizing basic needs over educational pursuits. Additionally, Cooper and Stewart (2020) support the current findings that household income positively affects children's outcomes, such as their learning, behavior, and health, especially in low-income families. Moreover, it is recommended that the government provide equal education opportunities and that education bureaus address the disparity in resource allocation between rural and urban areas.

In contrast, the present findings differ from those of Casas (2023), who found no significant relationship between family income and academic achievement. Despite this, the author emphasized that students did not perceive their family’s income as a hindrance to achieving academic excellence. Evidently, among household-related socio-demographic factors, access to electricity and annual family income showed a significant positive correlation with regional literacy rates and a significant but negative correlation with poverty incidence.

Lastly, there is a significant moderate negative correlation between regional basic literacy rates and the percentage of families with loans, while the relationship with functional literacy shows only marginal significance.

Correlation between Technology-Related Demographics and Regional Literacy Rates

The correlation between technology-related demographics and literacies were presented (see Table 2), including access to email and research, access to social media, usage of owned ICT devices for learning, with owned ICT devices, families that owned a cellular phone, families that owned a television, families that owned a personal computer, families with a cable subscription, families who used the internet, familiarity with open distance learning (ODL), willingness to engage in open distance learning (ODL). The findings revealed that basic literacy demonstrated a strong and statistically significant correlation with access to email and research ($\tau = .617$, $p < .001$) as well as social media platforms ($\tau = .652$, $p < .001$). Likewise, functional literacy also shows strong positive correlations with access to email and research ($\tau = .602$, $p < .001$) and social media ($\tau = .593$, $p < .001$). This suggests that increased access to email, research tools, and social media may contribute to higher regional basic and functional literacy rates.

The results suggest that increasing digital access, specifically to email, research work, and social media, improves literacy levels. This aligns with the findings of Bower (2019), who emphasized that technology mediates learning and that overall engagement with digital tools enhances learning outcomes. Similarly, the study by Polanco-Levicán and Salvo-Garrido (2022) supports the current results by demonstrating that using social media and developing social media literacy enhance cognitive abilities such as critical thinking, technical competencies, and socio-emotional outcomes. Furthermore, Astaño (2025) described that social media can be a learning tool that affects engagement and academic achievement. Specifically, using social media, including TikTok, Facebook, and YouTube Shorts as essential educational tools, enhances communication skills, such as reading and writing.

Table 2.

Correlation of Regional Literacy Rates and Technology-Related Demographics

Literacy Rate[a]	Technology-Related Demographics	Kendall's tau (τ)	*p*
Basic Literacy (%) 10 years old and over	Access to email and research	.617***	<.001
	Access to social media	.652***	<.001
	Usage of owned ICT devices for learning	.237	.187

	Families who used the internet[c]	.239	.186
	With owned ICT devices[b]	.528*	.003
	Families that owned a cellular phone	.394*	.029
	Families that owned a television	.474**	.008
	Families that owned a personal computer	.504**	.005
	Families with a cable subscription	-.409*	.023
	Familiarity with ODL[d]	.133	.458
	Willingness to engage in ODL[d]	-.082	.650
Functional Literacy (%) 10 to 64 years old	Access to email and research	.602***	<.001
	Access to social media	.593***	<.001
	Usage of owned ICT devices for learning	.252	.161
	Families who used the internet[c]	.209	.247
	With owned ICT devices[b]	.602***	<.001
	Families that owned a cellular phone	.468**	.009
	Families that owned a television	.519**	.004
	Families that owned a personal computer	.548**	.002
	Families with a cable subscription	-.364*	.043
	Familiarity with ODL[d]	.133	.458
	Willingness to engage in ODL[d]	-.067	.710

a. Philippine Statistics Authority, Functional Literacy, Education and Mass Media Survey 2019/ Regional Rates
b. With owned ICT devices refers to households that own at least one of the following: personal computer (desktop, laptop, netbook, iPad, iPod, tablet), cellular phone, television, cable, radio, or broadband internet, fiber internet/DSL
c. Usage from January to June 2019
d. Open distance learning (ODL)
Sig. (2-tailed): *p <.05, ** p <.01, *** p <.001

Interestingly, the correlation between literacy and using personally owned ICT devices for learning was weak and statistically insignificant. This suggests that while access to technology is present, other factors may contribute to the disparities observed in regional

literacy rates.

According to the FLEMMS report in 2019, only 73.8% of individuals used ICT devices for learning, and others were focused on other activities, indicating that mere access does not guarantee educational use or improved literacy outcomes (Philippine Statistics Authority, 2019b). Similarly, the correlation between regional literacy rates and internet usage among families from January to June 2019 was weak and not statistically significant.

These findings suggest that while internet access is available, it does not necessarily translate to improved literacy, especially if usage is not focused on educational or literacy-related activities. This is supported by national data indicating that the most common online activity among families was online purchasing (32.6%), followed by online banking (9.0%) and online selling (6.7%), reflecting a trend toward transactional activities rather than educational use of the internet (Philippine Statistics Authority, 2019a). Additionally, Pérez-Juárez et al. (2023) argued that assessing technology use and mitigating digital distractions, such as social media and off-task activities like messaging, are crucial in education. Moreover, it is also imperative for individuals to recognize that these distractions, including multitasking, can be detrimental and often lead to the development of poor habits (Dontre, 2020).

The results revealed a significant positive relationship between regional literacy levels, both basic and functional, and the different ownership of ICT devices such as cellular phones, televisions, and personal computers. Notably, functional literacy demonstrates stronger correlations across all categories of device ownership than basic literacy, suggesting that access to technology may substantially foster higher regional functional literacy skills. Specifically, ownership of any ICT device shows a strong and statistically significant positive correlation with both basic literacy ($\tau = .528$, $p = .003$) and functional literacy ($\tau = .602$, $p < .001$). This suggests that general access to technology supports literacy development through a cellular phone, television, cable, radio, broadband internet, fiber internet/DSL, or personal computer (desktop, laptop, netbook, iPad, iPod, tablet).

Additionally, cellular phone ownership in the family exhibits a moderate yet statistically significant positive correlation with basic literacy ($\tau = .394$, $p = .029$) and functional literacy ($\tau = .468$, $p = .009$). These findings indicate that mobile phones, while not as powerful as computers, still contribute to literacy, particularly in enabling communication and access to information. These findings align with Ahmad (2020), who observed a positive student perception of cellphones as practical learning tools.

On the other hand, television ownership in the family also demonstrates a moderate to strong positive correlation with basic literacy ($\tau = .474$, $p = .008$) and functional literacy ($\tau = .519$, $p = .004$). This implies that exposure to televised content can support literacy skills, likely through language modeling, educational programming, and increased general knowledge.

These findings were corroborated by the study of Kahn-Horwitz and Saba (2017), in which reading abilities were improved using subtitles in television programs. Furthermore, personal computer ownership in the family reveals one of the strongest positive correlations with literacy, basic literacy ($\tau = .504$, $p = .005$), and functional literacy ($\tau = .548$, $p = .002$). This suggests that computers provide users with extensive learning tools such as word processors, e-books, online courses, and educational software that support literacy development (Chee, 2024; Dimoji & Onuoha, 2016; Richter et al., 2022; Swartout, 2013). Overall, the findings on technological access are supported by the study of Plata et al. (2024), which emphasizes that the availability of diverse technological tools is a fundamental component of any 21st-century literacy program.

Interestingly, despite the significant positive correlation of literacy with family television ownership, the results revealed a significant and moderate negative correlation between basic literacy and families with a cable subscription ($\tau = -.409$, $p = .023$). Likewise, a significant negative correlation was observed between functional literacy and cable subscription ($\tau = -.364$, $p = .043$). This indicates a negative relationship between cable television subscription and literacy development, which may be attributed to the displacement of time that could otherwise be spent on reading, studying, or engaging in educational activities.

Another possible explanation is that those with lower regional literacy rates may be more inclined to rely on passive entertainment, such as television dramas, rather than activities that enhance literacy. Consistent with the statements of Javed and Mahmood (2017), cable television promotes new trends in fashion, cultural influences, and social norms among distance education learners. Such exposure may divert attention from academic priorities, contributing to a negative impact on their overall learning outcomes. Moreover, Khan and Paracha (2019) argued that television is an effective tool for entertainment; however, they emphasized that TV programs should be developed in collaboration with experts in education, academic researchers, and producers.

They further suggested that both government and non-governmental organizations should play an active role in establishing educational television. Such initiatives could help address challenges in underdeveloped countries, including a shortage of qualified teachers, issues with the education system, and low parental education levels. Notably, in the Philippines, both cable subscription and free-to-air television provide access to educational content through DepEd TV, an initiative by the Department of Education (DepEd). DepEd TV broadcasts educational programs nationwide via 15 radio, television, and cable operators. Additionally, the content is accessible online through the DepEd TV Official Channel on YouTube and the DepEd Philippines Facebook pages (DepEd, 2021). In summary, these programs provide learners with educational content aligned to their interests that would

significantly improve regional literacy and learning outcomes.

Additionally, the correlation analysis revealed no significant relationship between familiarity with open distance learning (ODL) and basic literacy (τ = .133, p = .458) and willingness to engage in ODL (τ = -.082, p = .650). Moreover, the correlation between functional literacy and familiarity with ODL was weak and positive (τ = .133), and the same with the correlation between functional literacy and willingness to engage in ODL (τ = -.067). However, neither correlation was statistically significant, with p-values of .458 and .710, respectively. This suggests that, regardless of familiarity with or willingness to engage in ODL, there is insufficient empirical evidence that functional and basic literacy levels significantly change or are influenced by these factors. Therefore, further investigation is required.

Correlation between Economic Factors and Regional Literacy Rates

The correlation analysis between economic factors and regional basic and functional literacy rates was presented (see Table 3). The factors include data reported in 2019 on per capita household final consumption expenditure, regional growth rates of government final consumption expenditure, and the average regional competitiveness score. Results revealed that both basic (τ = .578, p < .001) and functional literacy (τ = .548, p = .002) show statistically significant and strong positive correlations with per capita household final consumption expenditure, indicating that regions with higher household spending tend to have higher literacy rates. This suggests that economic well-being at the household level contributes positively to access to education and learning resources. These results were consistent with the investigation of Naoi et al. (2021), which found that family income in most cases was positively correlated with the development of learners' cognitive outcomes, including the educational expenditure of the family.

Consistently, the inquiry conducted by De Jesus and Vinoya (2025) also highlighted a moderate and significant correlation between PISA science literacy scores and family expenditure on education. Meanwhile, the study of Qiu and Ye (2023) reported that the family's socio-economic status can also predict the learning engagement of college students. Additionally, basic literacy has a moderate and statistically significant correlation with government final consumption expenditure regional growth rates (τ = .364, p = .043).

In contrast, functional literacy shows a similar but not statistically significant correlation (τ = .349, p = .052). This suggests that increases in government spending may support high basic literacy rates to some extent, but do not strongly predict functional literacy. Nevertheless, the World Bank (2019) reported that despite increased government spending on education, the results of the National Achievement Test (NAT) have remained largely stagnant, with only slight improvements.

Table 3.

Correlation of Regional Literacy Rates and Economic Factors

Literacy Rate[a]	Economic Factors	Kendall's tau (τ)	*p*
Basic Literacy (%) 10 years old and over	Per capita household final consumption expenditure (2019)	.578**	.001
	Government final consumption expenditure regional growth rates (2019)	.364*	.043
	Average regional competitiveness score (2019)[b]	.538**	.004
Functional Literacy (%) 10 to 64 years old	Per capita household final consumption expenditure (2019)	.548**	.002
	Government final consumption expenditure regional growth rates (2019)	.349	.052
	Average regional competitiveness score (2019)[b]	.588**	.002

a. Philippine Statistics Authority, Functional Literacy, Education and Mass Media Survey 2019/ Regional Rates
b. Data from 16 regions were considered valid, excluding the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) due to the unavailability of data in the years 2018, 2019, or 2020.
Sig. (2-tailed): *p <.05, ** p <.01

This was particularly evident in the findings from School Year 2009-2010 to SY 2014-2015, where fluctuations in Mean Percentage Scores (MPS) indicated little to no significant progress on both elementary and secondary levels. Furthermore, the Second Congressional Commission on Education (2024) reported that challenges in the education sector persist, such as inadequate resource investment despite increased government spending, inefficient resource utilization, and limited participation of stakeholders.

Furthermore, basic literacy (τ = .538, p = .004) and functional literacy (τ = .588, p = .002) exhibit strong and statistically significant association with the average regional competitiveness score, highlighting that regions with better government efficiency, economic dynamism, resiliency, infrastructure and innovation tend to have higher literacy rates. These findings align with the assertion of Patrinos et al. (2017) that higher literacy rates are linked to healthier citizens, consistent economic stability, lower crime rates, and higher employment rates. Meanwhile, for individuals, literacy is a foundational skill necessary for acquiring advanced competencies, leading to higher wages and more employment opportunities.

Additionally, according to UNESCO (2017), children and adolescents in low-income countries consistently exhibit higher rates of illiteracy compared to those in lower-middle, upper-middle, and high-income countries. Notably, the NWT Literacy Council (2008) stated that literacy rate is an essential indicator of economic performance, influencing local and national economies. On the other hand, Frontier College (2021) emphasized that higher literacy levels in the workforce contribute to improved quality of work, higher output, and profitability. Likewise, enhanced literacy decreases time in the task, reduces error rates, and

minimizes waste products. In brief, findings suggest that while government spending has limited influence, per capita household final consumption expenditure and regional competitiveness scores strongly correlate with basic and functional literacy rates.

Predictors of Regional Basic and Functional Literacy Rates

Multiple regression analysis was performed in each of the categories: regional household-related socio-demographics, technological access, and economic factors. Specifically, a stepwise data entry method was used to determine significant predictors of regional basic and functional literacy rates. The regression analysis revealed a statistically significant ($p < .001$) and strong negative relationship ($\beta = -.90$) between poverty incidence among families and basic literacy (see Table 4).

Moreover, the unstandardized beta coefficient of -0.27 (95% CI: -0.34, -0.20) indicates that for every 1% increase in poverty incidence among families, basic literacy rates are predicted to decrease by 0.27 percent. Notably, poverty incidence explains a substantial 80% variation in basic literacy rates, $F(1,15) = 64.72$, $p < .001$, highlighting its high influence among household-related socio-demographics on basic literacy. Furthermore, multicollinearity was not an issue in the stepwise regression, as supported by a variance inflation factor (VIF) of less than 5. The model also exhibited no autocorrelation, with a Durbin-Watson value of 2.07, indicating a well-constructed model.

Table 4.

Regression Analysis for the Household-Related Demographics Influencing Basic Literacy

Variable	*b*	*SE*	β	*t*	*p*	95% CI	
						Lower	Upper
Intercept	99.98	0.68		147.76	< .001	98.54	101.43
Poverty incidence among families	-0.27	0.03	-.90	-8.05	< .001	-0.34	-0.20

VIF < 5, Durbin-Watson = 2.07, $R = .90$, $R^2 = .81$, $R^2_{adj} = .80$, $F(1,15) = 64.72$, $p < .001$

Likewise, similar results were obtained for functional literacy (see Table 5); the analysis indicates a statistically significant ($p < .001$) and strong negative relationship ($\beta = -.86$) between poverty incidence among families and functional literacy. The unstandardized beta coefficient of -0.44 (95% CI: -0.58, -0.30) highlights that for every 1% increase in poverty incidence among families, functional literacy rates are predicted to decrease by 0.44 percent in regions. This suggests that higher poverty rates within families are strongly associated with lower levels of functional literacy.

Poverty incidence explains a substantial 72% variation in functional literacy rates, $F(1,15) = 10.90$, $p < .001$, highlighting its considerable influence as a predictor. Additionally,

the variance inflation factor (VIF) value below 5 confirmed the absence of multicollinearity in the stepwise regression. The Durbin-Watson statistic for the model was 2.38, which suggests no significant autocorrelation among the residuals, supporting the better construction of the model. In summary, poverty incidence significantly predicted regional basic and functional literacy rates. These results were consistent with the study of Gay et al. (2020), where they reported that the level of household poverty was a significant predictor of reading skills in the context of early childhood education. Likewise, Dolean et al. (2019) emphasized that socioeconomic status significantly influences reading skills' initial development and progression. Both authors argued the need to recognize socioeconomic factors, highlighting their crucial role in informing and improving educational practices, including the development of policies in government that support literacy development (Albert, 2021).

Table 5.

Regression Analysis for the Household-Related Demographics Influencing Functional Literacy

Variable	*b*	*SE*	β	*t*	*p*	95% CI	
						Lower	Upper
Intercept	97.09	1.36		71.34	< .001	94.19	99.99
Poverty incidence among families	-0.44	0.07	-.86	-6.51	< .001	-0.58	-0.30

VIF < 5, Durbin-Watson = 2.38, $R = .86$, $R^2 = .74$, $R^2_{adj} = .72$, $F(1,15) = 10.90$, $p < .001$

Additionally, the linear regression analysis reveals a statistically significant ($p < .001$) and strong positive relationship ($\beta = .75$) between access to email and research on basic literacy (see Table 6). The unstandardized beta coefficient of 0.27 (95% CI: 0.14, 0.40) indicates that for every one percent increase in access to email and research, regional basic literacy rates are predicted to increase by 0.27 percent. This suggests that greater access to these technologies is associated with higher basic literacy levels.

Specifically, access to email and research explains 53% of the variation in basic literacy rates, $F(1,15) = 19.06$, $p < .001$, highlighting its considerable influence as a predictor. Furthermore, multicollinearity was not an issue in the stepwise regression, as supported by a variance inflation factor (VIF) of less than 5. The model also exhibited no autocorrelation, with a Durbin-Watson value of 1.39 indicating a well-constructed model.

Table 6.

Regression Analysis for the Technology-Related Demographics Influencing Basic Literacy

Variable	*b*	*SE*	β	*t*	*p*	95% CI	
						Lower	Upper
Intercept	79.72	3.68		21.64	< .001	71.86	87.57
Access to email and research	0.27	0.06	.75	3.37	< .001	0.14	0.40

VIF < 5, Durbin-Watson = 1.39, $R = .75$, $R^2 = .56$, $R^2_{adj} = .53$, $F(1,15) = 19.06$, $p < .001$

Likewise, the linear regression analysis indicates a statistically significant ($p < .001$) and strong positive relationship (β = .77) between families that owned a television and functional literacy (see Table 7). The unstandardized beta coefficient of 0.48 (95% CI: 0.26, 0.70) reveals that for a 1% increase in the family that owned a television, regional functional literacy rates are predicted to increase by 0.48 percent. This suggests that television ownership within families is associated with higher levels of functional literacy.

Families owning a television explain 56% of the variation in functional literacy rates, $F(1,15) = 17.23$, $p < .001$. Furthermore, multicollinearity was not an issue in the stepwise regression analysis, as supported by a variance inflation factor (VIF) of less than 5. The model also exhibited no autocorrelation, with a Durbin-Watson value of 2.18, indicating a well-constructed model. In brief, access to technology such as email, research, and television exhibits significant predictors of regional literacy rates in the country. These results are supported by the assertions of Sun et al. (2021) that learners must have access to quality reading materials in either print or digital formats.

This suggests that access to technology is crucial in developing literacy, especially during the pandemic and the new normal. Meanwhile, Carpena (2022) suggested several potential technologies to promote literacy, such as incorporating educational television, interactive TV plug-ins, digital game-based learning, and immersive reading tools.

Consistently, the study of Averion et al. (2020) found that using LED TVs in the classroom is an effective and practical educational technology that enhances teaching and learning by improving competence, confidence, and effectiveness. Noteworthy, Espinosa et al. (2023) argued that integrating technology in a developing country like the Philippines is a significant undertaking.

Table 7.

Regression Analysis for the Technology-Related Demographics Influencing Functional Literacy

Variable	*b*	*SE*	β	*t*	*p*	95% CI	
						Lower	Upper
Intercept	52.56	8.16		6.44	< .001	35.16	69.95
Families that owned a television	0.48	0.10	.77	4.62	< .001	0.26	0.70

VIF < 5, Durbin-Watson = 2.18, $R = .77$, $R^2 = .59$, $R^2_{adj} = .56$, $F(1,15) = 17.23$, $p < .001$

While technology is a valuable support in promoting quality education, it requires substantial public investment in information and communication technology (ICT). This proposition must be supported by well-crafted legislation that envisions an ICT-ready Philippines and ensures a highly coordinated and systematic approach. Once this foundation is established, advancing educational technology (EdTech) will become more manageable. Furthermore, the linear regression analysis demonstrates a statistically significant ($p < .001$) and strong positive relationship ($\beta = .73$) between regional competitiveness score and basic literacy rate (see Table 8).

The unstandardized beta coefficient of 0.59 (95% CI: 0.28, 0.90) indicates that for every one-unit increase in the regional competitiveness score, basic literacy scores are predicted to increase by 0.59 percent. This suggests that higher regional competitiveness is associated with higher basic literacy rates. The regional competitiveness score explains a substantial 50% variation in basic literacy rates, $F(1,15) = 6.74$, $p < .001$. Additionally, the variance inflation factor (VIF) value below 5 confirmed the absence of multicollinearity in the stepwise regression. Meanwhile, the Durbin-Watson statistic for the model was 1.78, which suggests no significant autocorrelation among the residuals, supporting the better construction of the model.

Table 8.

Linear Regression for the Economic Factors Influencing Basic Literacy

Variable	*b*	*SE*	β	*t*	*p*	95% CI	
						Lower	Upper
Intercept	74.24	7.23		14.20	< .001	63.10	85.39
Regional competitiveness score	0.59	0.14	.73	4.11	< .001	0.28	0.90

VIF < 5, Durbin-Watson = 1.78, $R = .73$, $R^2 = .53$, $R^2_{adj} = .50$, $F(1,15) = 6.74$, $p < .001$

Likewise, the regression analysis also reveals a statistically significant ($p < .001$) and strong positive relationship ($\beta = .75$) between regional competitiveness score and functional literacy (Table 9). The unstandardized beta coefficient of 1.04 (95% CI: 0.54, 1.54) indicates that for every one-unit increase in the regional competitiveness score, functional literacy scores are predicted to increase by 1.04%. This suggests that higher regional competitiveness is associated with higher levels of functional literacy. The regional competitiveness score explains an even greater 54% variation in functional literacy rates, $F(1,15) = 18.00$, $p < .001$. Furthermore, multicollinearity was not an issue in the stepwise regression, as supported by a variance inflation factor (VIF) of less than 5. The model also exhibited no autocorrelation, with a Durbin-Watson value of 2.08, indicating a well-constructed model.

Table 9.

Regression Analysis for the Economic Factors Influencing Functional Literacy

Variable	*b*	*SE*	β	*t*	*p*	95% CI	
						Lower	Upper
Intercept	52.24	8.54		6.11	< .001	34.024	70.46
Regional competitiveness score	1.04	0.24	.75	4.44	< .001	0.54	1.54

VIF < 5, Durbin-Watson = 2.08, $R = .75$, $R^2 = .57$, $R^2_{adj} = .54$, $F(1,15) = 18.00$, $p < .001$

As presented, regional competitiveness scores are significant predictors of literacy rate. Noteworthy, these results are consistent with the correlation analysis, which demonstrates that regions with better economic dynamism, government efficiency, resiliency, infrastructure, and innovation tend to have higher regional literacy rates. Moreover, findings were corroborated by the report of UNICEF (2024) that the country is experiencing a learning crisis, where students are prevented from achieving their full potential due to several economic constraints. Similarly, the Programme for International Student Assessment revealed that compared to countries with similar economic status, the Philippines lags by five to six years in terms of education outcomes (OECD, 2023a; OECD, 2023b).

Furthermore, consistent with literacy report of the Philippine Statistics Authority (2019b) and educational disparity reports from UNICEF (2024), some regions, particularly in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), are even further behind, with an additional gap of up to two years. Moreover, the OECD (2024) reported that higher levels of adult literacy proficiency are associated with better social and economic outcomes. With this, the current study hopes its results will be considered in providing targeted interventions for regions with lower basic and functional literacy rates.

Policy Recommendations for Higher Regional Literacy Rates

This study develops policy recommendations for achieving higher regional basic and functional literacy (see Figure 1). Primarily, the recommendations were delimited to the findings of the investigations on the correlations of household-related demographics, technological access, and economic factors on regional literacy rates. Firstly, the policy recommendations started with the baseline data on the regional basic and functional literacies retrieved from the final reports of the Philippine Statistics Authority.

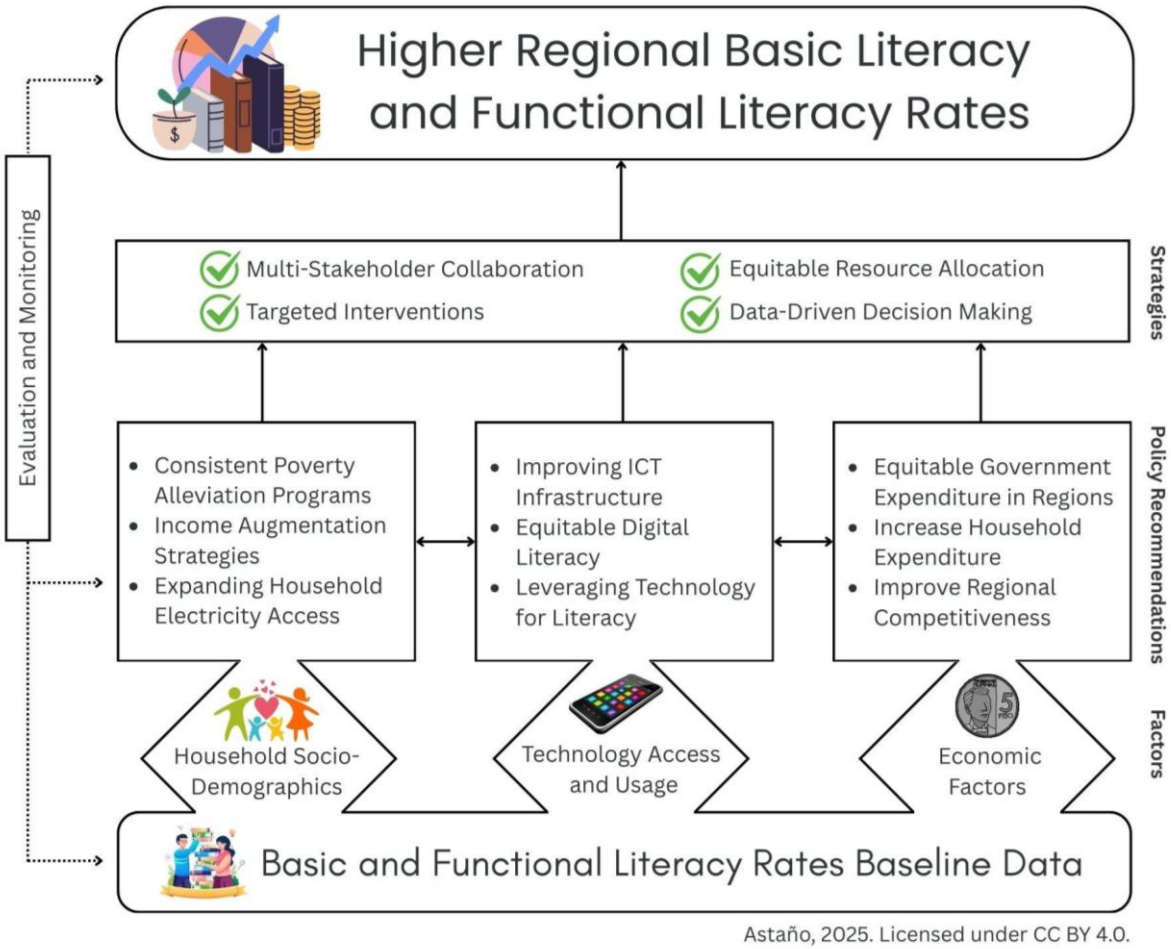
Noteworthy, results showed that household access to electricity, poverty incidence among families, and average annual family income significantly correlate with the regional basic literacy and functional literacy. Therefore, it is suggested that the government implement equitable mechanisms in all regions for consistent poverty alleviation programs, a sustainable system for income augmentations, and expansion of household electricity access. Additionally, this study also argued that technological access is crucial for the development of literacy.

Data revealed that access to email and research, social media, ICT devices, and families that owned cellular phones, televisions, and personal computers are significantly correlated with regional literacy rates. Therefore, equitable access to ICT gadgets and improved ICT infrastructure is essential for achieving higher literacy levels. However, as highlighted in the investigation, these technologies must be purposefully integrated into the learning process, ensuring everyone can leverage technology in literacy education. Furthermore, economic factors, such as per capita household final consumption expenditure and average regional competitiveness scores, strongly correlate with regional literacy rates. However, government final consumption expenditure was only significantly associated with the basic literacy rate.

In light of these findings, the government should prioritize equitable budget allocation across regions, promote increased spending on sustainable livelihood and education-related needs, and achieve high levels of regional competitiveness to improve literacy outcomes. On the other hand, poverty incidence, access to email and research, families with access to television, and regional competitive scores are significant predictors of literacy. Using the results from the current study, this investigation proposes several strategies to enhance literacy rates across regions, including multi-stakeholder collaboration, targeted interventions, equitable resource allocation, and data-driven decision-making.

Figure 1.

Policy Recommendations for Achieving Higher Regional Literacy Rates



With this, the current investigation is hopeful that regional alleviation programs, household income, and electricity access have improved after implementing the policy recommendations and strategies. Furthermore, equitable access to personally owned ICT devices and household conveniences, such as computers, cellphones, and televisions, is observed. Additionally, government expenditure, household spending, and regional competitiveness are expected to increase.

Likewise, all efforts from various stakeholders will result in higher regional basic literacy and functional literacy in the country. This scholarly work is strongly aligned with SDG 4: Quality Education, as it emphasizes the improvement of basic and functional literacy through equitable access to ICT, electricity, and education resources. It also consistent to SDG 1: No Poverty, since poverty incidence and family income were found to significantly influence literacy outcomes, highlighting the need for poverty alleviation programs and income augmentation to support learning. Lastly, the study relates to SDG 10: Reduced Inequalities,

because the policy recommendations call for equitable distribution of resources, technological access, and government expenditure across regions to close literacy gaps and promote inclusive development.

Conclusion

This study determined the correlation between regional household demographics, technological access, and economic factors on basic and functional literacy. Using data from government websites, such as the Philippine Statistics Authority, this inquiry is a retrospective causal-comparative study on the influences of various demographic factors on regional literacy rates. Results revealed that household access to electricity has a significant positive correlation. Meanwhile, poverty incidence among families and average annual family income in 2018 and 2021 are significant and negatively correlated with regional basic and functional literacies.

Additionally, findings demonstrated that access to email and research, social media, ICT devices, and families that owned cellular phones, televisions, and personal computers are significant and positively correlated with regional literacy rates. On the other hand, budgetary and economic factors, such as per capita household final consumption expenditure and average regional competitiveness scores, had significant and positive correlations with regional literacy rates. Meanwhile, government final consumption expenditure is significantly correlated to basic literacy rates. Furthermore, findings demonstrate that poverty incidence, access to email and research, families with access to television, and regional competitive scores are significant predictors of regional basic and functional literacy rates.

In addition, the study revealed disparities in literacy rates across regions, influenced by various factors. This highlights the need for the government to develop consistent and equitable programs to improve literacy nationwide. Special attention should be directed toward regions with lower literacy rates, addressing their specific challenges. Furthermore, this investigation argued that improving literacy levels is not solely the responsibility of a single government department, such as the Department of Education or the Commission on Higher Education.

This is attributed to the fact that the Functional Literacy, Education, and Mass Media Survey (FLEMMS) incorporates students and individuals up to 64 years old, covering both basic and functional literacy. Therefore, governments, including multi-sectoral stakeholders, are expected to implement poverty reduction initiatives, increase household incomes, and expand access to essential services such as electricity, including household conveniences such as cellphones, personal computers, and televisions. Additionally, technology must be purposefully integrated into education and literacy programs. Awareness campaigns at the barangay level can help promote the effective use of technology in learning. Furthermore, government and household spending on education should be increased, which is equitable

across regions, to support improvements in literacy. Finally, efforts to maintain and enhance regional competitiveness must be sustained.

Limitations of the Study and Recommendations for Future Scholarly Works

The findings of this scholary work offer actionable strategies for improving regional literacy rates, the study also identifies various limitations and provides recommendations for future research.

The study is limited to data gathered from government websites like the Philippine Statistics Authority (PSA) and the Department of Trade and Industry (DTI), specifically the reports on regional literacy rates, household demographics, technological access, and economic factors. However, some demographic indicators, such as poverty incidence and average family income, were not from the same year as the literacy survey. As a result, this ex post facto research design is constrained by the availability and alignment of data, relying only on the most relevant and accessible information.

As mentioned, this inquiry was dependent on the availability of secondary data. Despite the comprehensive information on literacy in the Functional Literacy, Education, and Mass Media Survey (FLEMMS), one notable limitation that may affect interpretation is that basic and functional literacy data do not entirely capture literacy concepts. According to Albert (2021), there are inherent biases in reported basic literacy rates, as self-reports rely on individuals' subjective understanding of their reading and comprehension abilities. Moreover, when respondents are asked to report literacy levels on behalf of others, prestige bias may be introduced, potentially leading to inflated basic literacy rates. Therefore, as recommended, diagnostic assessments or standardized tests may be considered to obtain more accurate literacy data. Notably, international assessments can also be reviewed to inform the restructuring and enhancement of the FLEMMS.

In addition, the average data on regional competitiveness scores were limited to 16 regions due to the unavailability of data in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) in 2019 or 2020. This limitation may affect the comprehensiveness of the regional analysis and implies that future studies should prioritize the inclusion of updated and complete datasets across all regions.

Future scholarly works may use the updated regional literacy rates from the Philippine Statistics Authority's Functional Literacy, Education, and Mass Media Survey (FLEMMS). Once demographic factors become available, this can be further investigated. Notably, this inquiry will also serve to validate the current results.

Other factors, such as health index, human development index, and government social protection programs, may be included in future studies to explore their association with

regional literacy rates, as these factors were not considered in the current investigation.

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