**Migration Letters**

Volume: 21, No: 2, pp. 520-534

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

# Formal Education and Poverty in Ecuador in 2021: An Analysis Based on Scientific Evidence

María Gabriela González Bautista[1], Wilson Efraín Seraquive Gualán[2], Patricia Hernández Medina[3], Eduardo Germán Zurita Moreano[4]

**Abstract**

*Formal education, understood as the process of acquiring knowledge and skills through educational institutions, is a powerful tool for improving living conditions and combating poverty. This research focuses on analyzing the effectiveness of education as a sustainable poverty reduction strategy through a theoretical review, statistical data analysis, and a logit econometric model using cross-sectional data. The results indicate that individuals with no formal education have a 3.73 times higher likelihood of being considered poor in terms of income, compared to a household head with higher education, making them more susceptible to experiencing this hardship. Similarly, maintaining the same reference point, household heads with literacy skills reflect a 2.48 times higher likelihood, those with a basic education level have a 3.7 times higher likelihood, and household heads with a middle/high school education level show a 2.31 times higher likelihood of being considered poor, being the least likely to experience income poverty when compared to the previously analyzed education levels, except when compared to someone with a higher education level.*

***Keywords:*** *human capital, economic development, unemployment, inequality.*

## 1. Introduction

Poverty in Ecuador is not a new problem, as a significant portion of the population has experienced this reality since the early days of the republic. The reduction or eradication of poverty has been an objective of the state, with significant progress achieved during the 2007-2017 period. However, in recent years, this trend has been disrupted, primarily due to restrictive fiscal policies and, secondly, due to the economic crisis caused by the pandemic in 2020 (National Institute of Statistics and Censuses [INEC], 2021).

In 2007, 36.7% of the population lived in poverty, with a continuous decrease in the following years, reaching the lowest proportion of 21.5% in 2017. However, poverty started to grow in the subsequent years, with values of 23.2%, 25.0%, and 33.0% in the years leading up to 2020. Regarding the educational levels of people in the labor market, in 2007, 5.5% had no formal education, 52.2% had a basic education, 22.6%

[1] Carrera de Economía, Universidad Nacional de Chimborazo, Riobamba Ecuador, mggonzalez@unach.edu.ec
[2] Carrera de Economía, Universidad Nacional de Chimborazo, Riobamba Ecuador, wilson.seraquive@unach.edu.ec
[3] Carrera de Economía, Universidad Nacional de Chimborazo, Riobamba Ecuador, patricia.hernandez@unach.edu.ec
[4] Carrera de Economía, Universidad Nacional de Chimborazo, Riobamba Ecuador, ezurita@unach.edu.ec

had a high school education, and 19.3% had a higher education. Similarly, in 2020, the percentage of people with no formal education decreased to 3.5%, those with basic education decreased to 42.25%, those with a high school education increased to 34.8%, and those with higher education decreased slightly to 19.2% (National Institute of Statistics and Censuses [INEC], 2021; Ortega-Gallo, Mejía-Ramírez, 2022).

Based on the data mentioned above, it is observed that as the educational levels of people in the labor market increase towards the high school level, poverty decreases, indicating an inverse relationship between these variables (Monteverde, 2018). As Hofmarcher (2021) notes in his research, "better educational levels improve employability, and progress in increasing the employment rate helps reduce poverty" (p. 2). Similarly, Zhang (2014), through a study conducted in China, found that education increases individuals' income and opportunities, lifting them out of poverty for future generations, provided that the cost of education does not rise faster than the income earned by parents.

Therefore, in Ecuador, a decrease in income and consumption poverty would be expected because education increases both and influences daily decisions regarding the standard of living a person wants to achieve. With the background information presented, this research aims to quantify the impact of education on the probability of an individual experiencing income poverty.

Given the high incidence of income poverty and the absence of serious, long-term government-driven strategies, the importance of this research becomes evident. The goal is to determine whether education, as a means to increase human capital, income, and reduce poverty, is a sustainable and effective long-term strategy, as proposed in the theory of human capital.

The objective is to analyze the impact of education at different levels on income poverty in Ecuador, using statistical information from 2021. To achieve this, a review and description of the theory of human capital is conducted as the theoretical basis linking the two variables of study. The situation is explained using data provided by the National Institute of Statistics and Censuses [INEC], and the impact of the independent variable is determined using an econometric model.

The thesis supporting the existence of a relationship between education and poverty has been present in economic science since its early days, when Adam Smith compared an educated person to a costly machine due to possessing skills and abilities that are difficult to acquire. These skills make individuals more productive, increase business productivity, and are considered a cause of economic growth. These ideas eventually formed the theory of human capital, which was used to support endogenous growth models.

There are various definitions of human capital, such as those proposed by Duran Peralta (2019), which consider aspects like skill, proficiency, efficiency, and productivity. However, the definition that best fits and clearly encompasses those qualitative components affecting individual capacity and improving productivity is the one that produces positive returns in work. These qualitative components are acquired through education and work experience, forming an additional stock of capital.

The way an increase in human capital contributes to poverty reduction follows this logical sequence: an improvement in education and work experience increases human capital, enhancing productivity, and thus increasing income while reducing the risk of poverty. This is because purchasing power increases, allowing better satisfaction of needs. This idea is supported by Becker and his proposal of constant income for those who do not educate themselves and increasing income for individuals who undergo

educational processes and accumulate experience. This correlation is evident in the studies of Oxa and Loayza-Lara (2017), where they conclude the existence of a positive correlation between education and income, emphasizing that the impact intensifies the younger the person and the more time they devote to their educational process.

## 2. Theoretical Framework

Education and Poverty

There are studies in various countries that have linked education to poverty, based on the theory of human capital. The initial studies applied logistic models since the dependent variable is presented in dichotomous terms of poverty or non-poverty. Among these, the research conducted by Villegas, Vargas, and Pérez (2016) in Bolivia stands out, identifying an inverse relationship between the variables. In other words, individuals with a higher level of education or years of schooling have a lower probability of being in a state of poverty.

Furthermore, other research efforts have focused on addressing potential endogeneity issues, as the educational level of individuals may be influenced by factors that also explain the poverty situation. Notable studies in this regard include those by Citak and Duffy (2020) and Hofmarcher (2021), both conducted in European countries, as well as other studies that applied different approaches and methodologies, such as the one conducted by Merino Núñez, Córdova Chirinos, Aguirre Pintado, García Yovera, & López Ñiquen (2020), and Arias and Sucari (2019). These studies similarly found an inverse relationship between the variables.

In summary, the definition and measurement of poverty must take on a multifaceted perspective. It is essential to consider three conceptual viewpoints that encompass social, economic, and material conditions. Institutions such as INEC (2008) define poverty as "a condition of lack or deprivation. Deprivations can be defined in terms of the satisfaction of needs or the effective enjoyment of rights, freedoms, or opportunities" (p. 6).

As for education, it is defined as a state achieved through organized, sequential, and supervised learning under the guidance of experts, benefiting individuals interested in attaining it. Other authors describe it as a rational, intentional effort to conceive and improve oneself as individuals through organized and continuous communication aimed at fostering learning (Millán-Valenzuela and Pérez-Archundia, 2019).

There are various forms or modalities of education, including formal education, which is regulated and legally supported by the state. According to Colom (2005), formal education leads to validated and accredited diplomas and certificates. Non-formal education is obtained through informal learning and tends to be more flexible, lacking legal support from the state. In both cases, both teachers and learners come together with pedagogical objectives. In contrast, informal education is provided through informal learning, where two types are distinguished: indirect education, where participants do not gather for pedagogical purposes, and occasional education, where at least one of the participants has learning objectives. It is through this type of education that individuals learn values, language, and social behaviors (UNESCO, 2012).

In Ecuador, formal education is a right, as established in the Constitution of the Republic of Ecuador, Chapter Two, Section Five, Article 26, where the National Education System is responsible for providing free education while maintaining standards of quality and religious independence at the initial, basic, and high school levels (Ministry of Education, 2017). This research employed the educational levels

specified by INEC to encompass and classify all surveyed individuals. The appropriate education levels were specified as none, literacy, basic, high school, and higher education.

Literacy education is an extraordinary type of formal education aimed at including all individuals aged 15 and older who have not accessed regular compulsory education for more than three years at the corresponding age. They have participated in special programs promoted by the state to teach reading and writing, with the goal of ensuring universal access to education (Ministry of Education, 2017).

Basic and high school education, on the other hand, are regular formal education provided by the National Education System. Basic education spans ten years and aims to develop sufficient competencies, skills, and abilities to progress to the next level. High school education, lasting three years, seeks to cultivate the necessary competencies for work, entrepreneurship, and access to higher education. In the case of higher education, it is provided by the National Higher Education System, which complements the preceding levels. It encompasses individuals who have accessed third-level technical-technological and degree-level education, as well as fourth-level or postgraduate education, as established in the Organic Law of Higher Education.

## 3. Materials and Methods

According to the level of information analysis, this research is quantitative in nature as it utilizes secondary data. In terms of scope, it falls under correlational studies as it aims to identify the relationship or degree of association between variables. To achieve this, three consecutive stages are outlined. In the first stage, there is a documentary review of the topic, followed by a characterization of the study variables using a descriptive design in the second stage. Finally, an econometric logit model is applied using the STATA statistical package to identify the impact through probabilities from the independent variable to the dependent variable.

The data are cross-sectional and correspond to the entire year 2021. They were collected through a two-stage probability sampling by the National Institute of Statistics and Censuses, with the study universe consisting of all individuals aged 5 and over residing in households, excluding those living in collective or floating housing or without shelter. The units of observation and the geographical coverage include all occupied private households located within the national territory, including the insular region.

In the first stage, the Primary Sampling Units [PSUs] are identified, which are clusters of 30 to 60 randomly selected households that reflect all characteristics and are perfectly defined and geolocated. A total of 15,456 PSUs were identified for the year 2021. Subsequently, in the second stage, 7 households were randomly selected for each PSU, which is the optimal number calculated to minimize variance within each PSU based on mathematical simulations. This number also best suits the operational technical load of a surveyor, resulting in a total of 108,192 surveyed households, of which 77,721 were included in the analysis. Only household heads with complete information were considered (INEC, 2021). The following table shows the PSUs and the number of surveyed households per province, as well as the cities included by the INEC to balance the sample, taking into account population differences among provinces (Table 1).

Table 1. Sample Size of the National Employment, Unemployment, and Underemployment Survey for the year 2021.

| Dominion | Primary Sampling Unit (PSU) | Sampled households |
|---|---|---|
| Quito | 1.632 | 11.424 |
| Guayaquil | 1.536 | 10.752 |
| Cuenca | 1.104 | 7.728 |
| Machala | 1.248 | 8.736 |
| Ambato | 1.008 | 7.056 |
| Azuay | 288 | 2.016 |
| Bolívar | 288 | 2.016 |
| Cañar | 288 | 2.016 |
| Carchi | 336 | 2.352 |
| Cotopaxi | 288 | 2.016 |
| Chimborazo | 288 | 2.016 |
| El Oro | 384 | 2.688 |
| Esmeraldas | 912 | 6.384 |
| Guayas | 336 | 2.352 |
| Imbabura | 720 | 5.040 |
| Loja | 528 | 3.696 |
| Los Ríos | 288 | 2.016 |
| Manabí | 336 | 2.352 |
| Morona Santiago | 192 | 1.344 |
| Napo | 240 | 1.680 |
| Pastaza | 288 | 2.016 |
| Pichincha | 624 | 4.368 |
| Tungurahua | 288 | 2.016 |
| Zamora Chinchipe | 288 | 2.016 |
| Galápagos | 192 | 1.344 |
| Sucumbíos | 384 | 2.688 |
| Orellana | 288 | 2.016 |
| Sto. Domingo de los Tsáchilas | 336 | 2.352 |
| Santa Elena | 528 | 3.696 |
| Total | 15.456 | 108. 192 |

Note. The annual sample is the result of combining surveys conducted in both provinces and the most important cities as defined by the INEC (2021).

LOGIT MODEL

The logit model allows for the analysis of probabilities and is characterized by accommodating the use of a categorical endogenous variable along with one or more independent variables, which can be either categorical or not. Among its advantages, it does not require a normal distribution in the data, can work with qualitative and quantitative values, variables can be dichotomous or polytomous, and it is easily interpretable since it is a generalized linear model (Rincón, 2023). This type of model utilizes the logistic function in its estimation process, instead of a linear function, and the results are presented as probability estimates of whether an individual in the sample belongs to a group or not, based on the explanatory exogenous variables that acquire a relative weight or degree of influence in the model.

The model is as follows:

$$\text{Prob}\ (Y_i = 0;\ Y_i = 1\ ) = \frac{1}{1+e^{-Z}} \qquad [1]$$

Where:

$P_i =$ Probability of the Logit model

$e =$ Euler's number (2,718)

$Z = \beta_0 + \beta_1 X_1 + \cdots + \beta_6 X_6 + \varepsilon_i$

$X_i =$ Vector of independent variables

The econometric model would be represented as follows.

$$PY_i = \frac{1}{1+e^{-\beta_0+\beta_1 Edu+\beta_2 ED+\beta_3 Ar+\beta_4 Gen+\beta_5 Ds+\beta_{10} ExS+\mu_i}} \qquad [2]$$

The variables included in the model are as follows (Table 2).

Table 2. Endogenous, Exogenous, and Control Variables Included in the Model.

| | | |
|---|---|---|
| Endogenous variable | | |
| $PY_i$: Poverty | No | Per capita income exceeds the poverty line. |
| | Yes | Per capita income does not exceed the poverty line. |
| Exogenous variable | | |
| Edu: Education | None | Individuals who never attended an educational institution or attended but did not pass. |
| | Literacy | Individuals over 15 years old who completed six months of study and can read and write. |
| | Basic Education | Person who completed their studies from the first to the tenth year. |
| | Middle/High School Education | People who completed the three years of high school. |
| | Higher Education | People who completed their studies in higher institutes, technical or pedagogical institutions, national or foreign universities or polytechnic schools. |
| Control variables | | |

| | | |
|---|---|---|
| ED: Age | | Years completed by the individual |
| Ar: Area | Urban | Urban People living in provincial capitals, cantonal and parochial heads with a population of 2,000 or more inhabitants |
| | Rural | People living in the surrounding rural areas.. |
| Gen: Gender | Male | Gender Male Belongs to the male gender. |
| | Female | Belongs to the female gender.. |
| Ds: Disability | No | Person who does not receive the Joaquín Gallegos Lara Bonus. |
| | Yes | Person who receives the Joaquín Gallegos Lara Bonus. |
| ExS: Employment by Sectors | Formal | People working in establishments with a Unique Taxpayer Registry (RUC) and having more than 100 workers. |
| | Informal | People working in economic establishments without RUC, self-employed, or in companies of informal employers |
| | Domestic | People working in private households as dependents or self-employed. |
| | Unclassified | Employed people who do not know if the establishment where they work has an RUC number. |
| $\mu_i$ | Random component of the model. | |

Note. Prepared based on INEC (2018).

## 4. Results and Discussion

Among the surveyed households, 67.8% of household heads are men, and 32.2% are women. Interestingly, 17.9% of male household heads are in poverty, compared to 19.6% of female household heads, indicating a 1.7% higher poverty rate among women. Similarly, when comparing poverty by areas of residence, it was identified that 30.4% of household heads living in rural areas are in income poverty compared to 14.3% of those living in urban areas, showing a considerable difference of 16.1%. Furthermore, it was found that 62.2% of household heads with disabilities are in poverty, compared to 18.3% of those without disabilities. This means that being a woman, living in a rural area, and having a disability significantly increases the risk of poverty.

When classifying the presence of income poverty based on the sectors in which household heads work, those working in the formal sector have the lowest poverty rate, with only 6.6% of them experiencing income poverty. In contrast, in the informal sector, 31.9% are considered poor, followed by those working in unclassified sectors with 26.7% and domestic employees with 15%.

Regarding education, in urban areas, 2.2% of household heads have no educational level, 0.2% have gone through literacy processes, 38.6% have basic education, 31.1% have middle/high school education, and 28% have higher education. This distribution

indicates that the majority of the sample has a basic education level, and the lowest percentage of household heads have a literacy level (see Table 3).

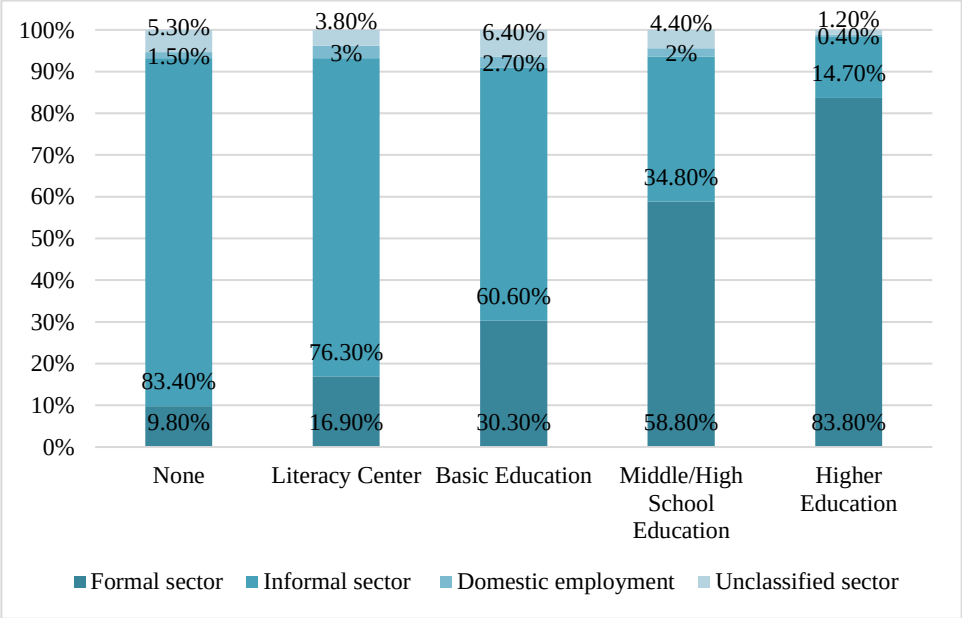
Table 3. Educational levels by area of residence in Ecuador as a percentage for the year 2021.

| Education Level | Urban | Rural |
|---|---|---|
| None | 2,2% | 8,3% |
| Literacy Center | 0,2% | 0,7% |
| Basic Education | 38,6% | 65,2% |
| Middle/High School Education | 31,1% | 18,3% |
| Higher Education | 28,0% | 7,5% |

Note. Self-prepared based on INEC (2021).

In rural areas, most people have a basic education level, with only 7.5% having a higher education level, compared to 28% of household heads living in urban areas, where educational levels are more evenly distributed among basic education, middle/high school education, and higher education (Table 3).

Figure 1. Educational levels by occupation sectors in Ecuador, 2021 period, in percentage.



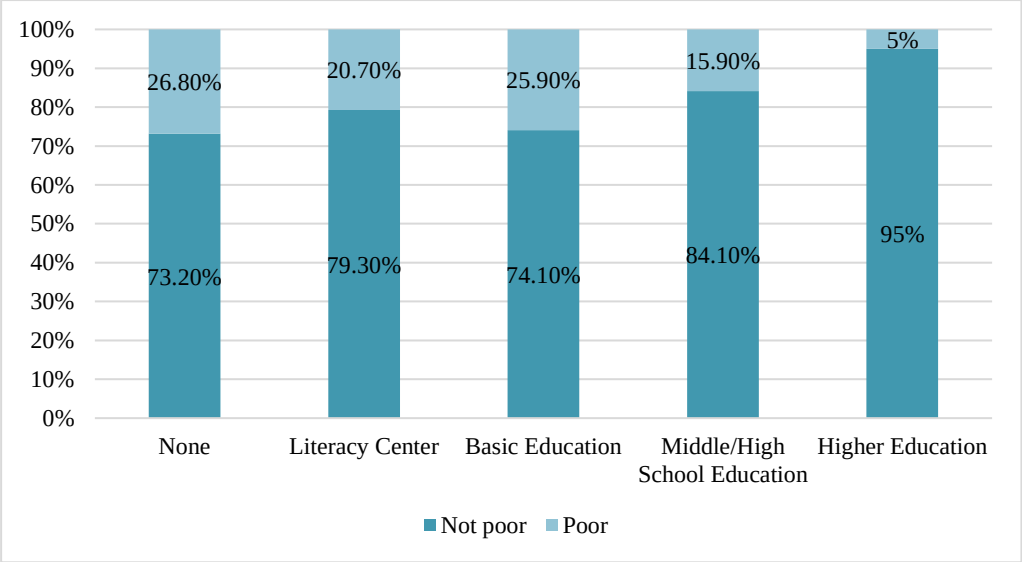

Nota. Elaboración propia con base en INEC (2021).

When cross-referencing the educational levels with the sectors in which household heads are employed, it can be observed that there is not much variation in terms of domestic employment and unclassified sectors. However, in the formal and informal sectors, a gradual interchange is evident, indicating that as household heads increase their educational level, they tend to work in the formal sector, and vice versa (see Figure 1).

Similarly, when the variables of poverty status and educational levels of household heads are cross-referenced, there is a decreasing trend in the percentages as educational levels increase, as indicated in Figure 2. In this figure, 26.8% of household heads with no educational level are considered income-poor, 20.7% of those with literacy level, 25.9% with basic education, 15.9% with middle/high school

education, and 5% of those with higher education, showing a decrease in proportions as educational levels increase.

Figure 2. Educational Levels and Poverty Among Household Heads in Ecuador, 2021 (%).




Note. Self-generated based on INEC (2021).

In logistic models, variables must be encoded to establish a basis for comparison that allows for the analysis of results. These comparisons are made according to the researcher's criteria based on the chosen study approach. In this case, the dependent variable enters the model as 0 for individuals who do not possess the studied attribute (income poverty) and as 1 for those who do. Similarly, the independent variable and categorical control variables are encoded (Table 4).

Table 4. Encoding of categorical variables.

| Variable | Category | Parameter Coding | | | |
|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) |
| Education level | None | 1,000 | ,000 | ,000 | ,000 |
| | Literacy center | ,000 | 1,000 | ,000 | ,000 |
| | Basic education | ,000 | ,000 | 1,000 | ,000 |
| | Middle/high school education | ,000 | ,000 | ,000 | 1,000 |
| | Higher education | ,000 | ,000 | ,000 | ,000 |
| Employee categorization | Formal sector | ,000 | ,000 | ,000 | |
| | Informal sector | 1,000 | ,000 | ,000 | |
| | Domestic employment | ,000 | 1,000 | ,000 | |
| | Unclassified sector | ,000 | ,000 | 1,000 | |
| Disability | Yes | 1,000 | | | |
| | No | ,000 | | | |
| Area | Urban | ,000 | | | |
| | Rural | 1,000 | | | |

| | | |
|---|---|---|
| Gender | Male | ,000 |
| | Female | 1,000 |

Note: The first (Received disability bonus, employee categorization) and last (Education level, area, gender) are based on INEC data (2021).

The reference variable is chosen as higher education because, based on the reviewed studies, individuals with higher education are less likely to experience income poverty. Similarly, the formal sector serves as the comparison category for the employee categorization variable, not having a disability for the disability variable, urban for the area of origin variable, and the male category for the gender variable – all of which are assumed to be less likely to exhibit the successful model attribute.

The model's coefficients omnibus test indicates that the included variables do contribute to explaining the variation in probability since the p-value is 0.000, which is less than 0.5. This means the hypothesis that the estimated β_i coefficients, except for the constant, are zero is rejected. Regarding the model's fit, the Cox and Snell determination coefficient is 0.136, and the Nagelkerke coefficient is 0.221. The latter is a corrected version that covers the full range from 0 to 1, indicating that the included variables in the model explain 13.6% and 22.1% of the variance of the dependent variable, respectively. The low fit can be attributed to the high number of observations, as these values tend to decrease as the number of observations increases and increase when more explanatory variables are added. Another way to measure fit is the classification table, which successfully classifies 81.7% of the time with a cutoff value of 0.5 and makes an error in 18.7% of cases.

The model's marginal effects are presented in Table 5, showing the variation in probability in the presence of a specific characteristic in a ceteris paribus context of the model. The results indicate that the calculated elasticities are statistically significant at a 95% confidence level since all Z-values are greater than 1.96, and their p-values are less than 0.05. They also have low standard error values, indicating that the model is more accurate in estimating the population mean.

Table 5. Marginal effects of exogenous variables.

| Variable | Category | dy/dx | Standard Error | z | p > \|z\| | Conf. Interval95% | |
|---|---|---|---|---|---|---|---|
| Education level | None | 0,147 | 0,00859 | 17,13 | 0,000 | 0,1304 | 0,1640 |
| | Literacy center | 0,090 | 0,02146 | 4,20 | 0,000 | 0,0480 | 0,1321 |
| | Basic education | 0,146 | 0,00355 | 41,12 | 0,000 | 0,1389 | 0,1528 |
| | Middle/high school education | 0,080 | 0,00351 | 22,87 | 0,000 | 0,0734 | 0,0871 |
| | Higher education | | | | | | |
| Age | | -0,003 | 0,00010 | -34,66 | 0,000 | -0,0036 | -0,0032 |
| Area | Rural | 0,070 | 0,00300 | 23,44 | 0,000 | 0,0646 | 0,0764 |
| Gender | Female | 0,006 | 0,00303 | 2,26 | 0,024 | 0,0009 | 0,0128 |
| Disability | Yes | 0,240 | 0,03448 | 6,96 | 0,000 | 0,1725 | 0,3076 |
| Employee categorization | Formal sector | | | | | | |
| | Informal sector | 0,202 | 0,00303 | 66,72 | 0,000 | 0,1963 | 0,2082 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Domestic employment | 0,049 | 0,00829 | 5,89 | 0,000 | 0,0326 | 0,0650 |
| Unclassified sector | 0,128 | 0,00633 | 20,24 | 0,000 | 0,1158 | 0,1406 |

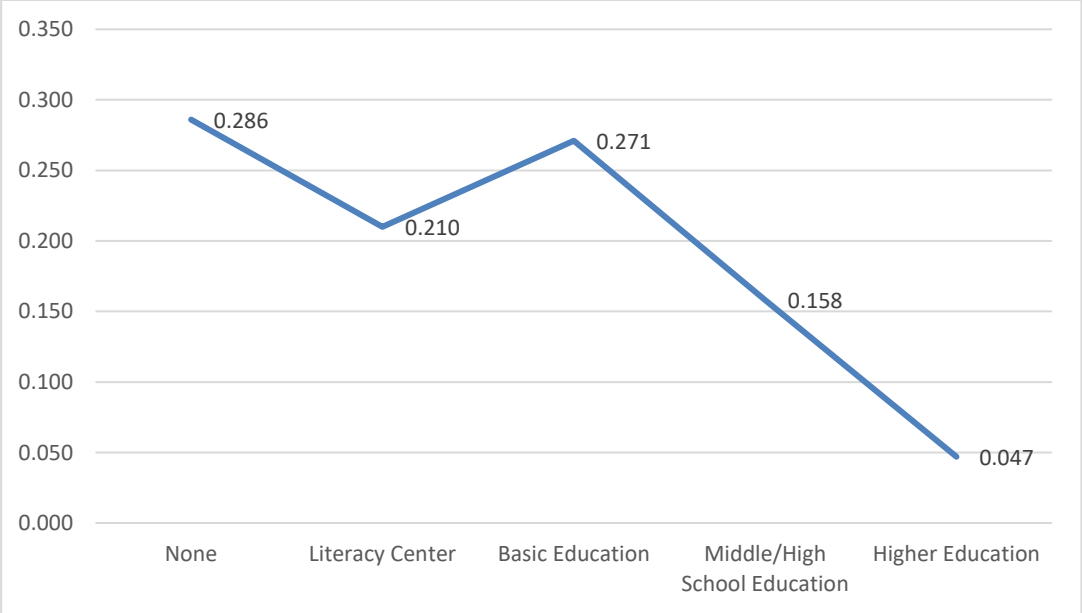
Note: dy/dx for factor levels is the discrete change from the baseline level, based on INEC data (2021).

The marginal effects of the education level variable indicate the following. A household head with no formal education has a 14.7% higher probability of being considered income-poor compared to a household head with higher education. If they have a literacy level, their probability increases by 9%, with basic education, the increase is 14.6%, and with middle/high school education, it's 8%, compared to the probability of poverty for a household head with higher education.

When analyzing the age variable, it is identified that for each additional year of the household head's age, their probability of experiencing income poverty decreases by 0.3%. If they live in a rural area, the probability increases by 7% compared to someone living in an urban area. Being female increases the probability by 0.6%, and having a disability raises the probability by 24% compared to a household head without a disability.

Similarly, when a household head works in the informal sector, their probability of being considered income-poor increases by 20.2% compared to a household head working in the formal sector. If they work in domestic employment, the probability increases by 4.9%, and if they work in unclassified sectors, it increases by 12.8%, compared to a household head working in the formal sector (Figure 3).

Figure 3. Average probability of model forecasts estimated by educational levels




Note: Prepared based on INEC data(2021).

Figure 3 is the result of averaging the model forecasts by educational levels, aiming to reflect how likely it is, on average, for a household head with a specific educational level to be considered income-poor. It demonstrates the decreasing trend as educational levels rise, indicating that on average, a household head with no formal education has a 28.6% probability of being considered income-poor. If they have literacy education, their probability is 21%, with basic education, it's 27.1%,

with middle/high school education, it's 15.8%, and if they have higher education, the probability of income poverty is 4.7%.

The results are consistent with research such as that conducted by Abubakar (2022) in Nigeria, where education is the second most significant predictor of poverty. Similarly, in the research by Liu, Li, Zhang, Ngo and Iqbal (2021) using data from South Asian countries, the result was similar.

In the studies by Bilenkisi, Gungor and Tapsin (2014), and Villegas, Vargas and Perez (2016), and Biyase and Zwane (2018), in which education measured in levels was used, it was similarly evidenced that the probability of household heads being in poverty decreases as educational levels rise, accelerating its decline from middle/high school education onwards.

However, there is a discrepancy in the speed of decline of the estimator of the educational level corresponding to literacy centers compared to that of basic education, indicating that a head of household with a literacy level is less likely to be in poverty than someone with basic education, an issue not evidenced in the Gounder and Xing (2012) study. This fact can be explained through what is known as the "poverty trap", addressed in the research of Brown and Park (2001). In this case, the heads of household due to their economic limitations provide few facilities for their children to be educated or, in the worst case, opt not to give them an education. In this situation, they take advantage of this time to increase their human capital through informal education and save the costs of basic education.

As for the more pronounced decrease in the estimator corresponding to the high school level of education compared to that of basic education, this is partly explained by the "sheepskin" effect established by Spence (2002), where the fact of having an academic degree generates additional returns compared to individuals with equivalent knowledge, but without a degree. Another determinant of such behavior is that, from that level, individuals have acquired sufficient human capital to be more productive, considering the socioeconomic characteristics of the country of study. As evidenced in the study by Hanjra, Ferede and Gutta (2009) in Ethiopia, where literacy increases the risk of poverty due to the characteristics of that country, contrary to what happens in studies conducted in other countries.

As for the control variables: area of origin, sex and age of the head of household, they show the same behavior. The area of origin is the most important in terms of effects on the probabilities in this study. However, in studies such as that of Khalid, Shahnaz and Bibi (2005) conducted in Pakistan, sex shows the opposite behavior, where the fact that a woman is the head of household decreases the probability of being poor, attributing this result to differences in behavior at the time of allocating existing economic resources, as well as to cultural aspects. This result is shared by the study by Werner et al. (2022), where women have higher economic returns than men with the same level of education in Burkina Faso.

The disability status of the head of household turned out to be a determining characteristic in terms of poverty status, in line with the results of research conducted by Pinilla-Roncancio (2017) and Pinilla-Roncancio et al. (2020). Individuals who have a disability evidence an elevated increase in the probability of suffering income poverty, which is completely logical, since their abilities to work and be equally productive as someone without a disability are, in most cases, impossible.

The sector in which the head of household works also shows values consistent with the study conducted by Canelas (2019), where they sought to describe how informality is constituted as one of the determinants of poverty, agreeing that, if the head of household does not work in the formal sector, ie, the head of household does not work in the formal sector, i.e., works in the informal sector, works as a domestic

employee or in unclassified sectors, the individual has a greater risk of living in poverty, with the former and the latter being, as in the case of this study, those that most increase the probability with respect to someone who works in the formal sector.

In summary, research supports the significant influence of education in determining poverty. As educational levels increase, the probability of heads of household falling into poverty decreases, especially after middle or high school education. However, a discrepancy in poverty decline between different educational levels, including literacy compared to basic education, stands out. This can be explained by the "poverty trap", where economic constraints may lead some heads of household not to provide formal education to their children, opting instead for informal education.

In addition, factors such as the area of origin, gender and age of the head of household, together with disability status, have been shown to have an impact on the probability of falling into poverty, although these effects may vary according to context and cultural characteristics. The sector in which the head of household works is also a key determinant, as those working in the informal sector face a higher risk of living in poverty compared to those employed in the formal sector. These findings highlight the importance of addressing education, gender equality and job creation in the formal sector as key strategies to combat poverty and improve the living conditions of families.

## 5. Conclusions

Education and poverty are variables that maintain a theoretical relationship explained by the theory of human capital, proposed and developed by Schultz, Becker, and Mincer. It serves as one of the possible explanations for endogenous growth not captured by capital accumulation – technological progress, by which the labor factor becomes more productive and generates higher income returns. This highlights that productivity increases as a result of higher human capital, which depends on education and experience, revealing a chain of causes that make it challenging to quantify the impact between the two variables.

Education positively impacts the reduction of income poverty in Ecuador. The proportion of people in poverty decreases from 26.8% for individuals with no formal education to 5% for those with higher education. The effects also show an increase, ranging from 8% to 14.7% when comparing the risk of income poverty between those with middle/high school education and those who have not achieved any formal education, indicating that lower educational levels correspond to higher risk of poverty, and vice versa.

An inverse relationship between education and poverty is evident. The probability of a household head being income-poor decreases as educational levels rise. According to the estimated model, those with no education have 3.73 times the probability of being considered income-poor compared to a household head with higher education, just as those with literacy education have 2.50 times the probability, those with basic education have 3.70 times the probability, and those with middle/high school education have 2.31 times the probability.

Formal education is an essential tool in the fight against income poverty. It increases individual incomes, promotes social mobility, provides access to better economic opportunities, and contributes to reducing inequality. It also represents a solid investment in a nation's development. To effectively address income poverty and promote economic prosperity, it is essential to continue investing in formal education and ensure equitable access to this source of economic and social empowerment.

Considering the results, it can be concluded that improving human capital through policies focused on increasing access to formal education and improving its quality would be an effective strategy to reduce income poverty. Increasing human capital through a chain of causes increases income, economic growth, and the ability to meet basic needs because there will be greater economic dynamism, leading to sustained employment and labor conditions, improving the long-term quality of life of Ecuadorians and reducing sensitivity to unsustainable public spending policies.

## 6. Recommendations

Given that the impact of education on poverty is related to modifications in variables such as productivity, which theoretically should show an increasing behavior after the accumulation of human capital, it is recommended that this relationship be measured in future research to clarify, evidence and deepen the understanding of the impact between the variables in this study. This will allow us to observe the degree of relevance of education in determining poverty status compared to other factors.

In addition, based on the results of this research and on what has been observed in similar studies carried out in other countries, the importance of education as an effective instrument for reducing poverty and promoting economic growth is reiterated. Therefore, it is recommended that the educational levels of the population be increased through efficient government policies that improve access to and quality of education in the countries.

## References

Abubakar , I. R. (2022). Multidimensional Poverty among Nigerian Households: Sustainable Development Implications. Soc Indic Res, 993–1014. doi:https://doi.org/10.1007/s11205-022-02963-0

Arias, L., Sucari, H. (2019). Efecto de la educación sobre la pobreza monetaria en las regiones del Perú. Revista Innova Educación, 98-109. doi:https://doi.org/10.35622/j.rie.2019.01.009

Biyase, M., Zwane, T. (2018). An Empirical Analysis of the Determinants of Poverty and Household Welfare in South Africa. The Journal of Developing Areas, 115-130. doi:doi:10.1353/jda.2018.0008.

Canelas, C. (2019). Informality and poverty in Ecuador. Small Bus Econ, 1097–1115. doi:https://doi.org/10.1007/s11187-018-0102-9

Çitak, F., & Duffy, P. (02 de Diciembre de 2020). The causal effect of education on poverty: evidence from Turkey. Eastern Journal of European Studies, 251-265.

Colom, C. A. (2005). Continuidad y Complementariedad entre la educación formal y no formal. l'Institut d'Estudis Catalans.

Duran Peralta, J. (2019). Regional development and entrepreneurship: Evidence for Colombia. El trimestre económico, 86(342), 467-490

Hanjra, M. A., Ferede, T., Gutta , D. G. (2009). Pathways to breaking the poverty trap in Ethiopia: Investments in agricultural water, education, and markets. Agricultural Water Management, 9. doi:https://doi.org/10.1016/j.agwat.2009.06.008

Hofmarcher, T. (2021). The effect of education on poverty: A European perspective. Department of Economics: School of Economics and Management, 16. doi:https://doi.org/10.1016/j.econedurev.2021.102124

Instituto Nacional de Estadística y Censos [INEC], (2021). Datos de la Encuesta Nacional de Empleo, Desempleo y Subempleo Acumulada, Encuesta Nacional de Empleo, Desempleo y Subempleo (ENEMDU) . Quito - Ecuador.

Merino Núñez, M., Córdova Chirinos, J. W., Aguirre Pintado, J. M., García Yovera, A. J., & López Ñiquen, K. E. (2020). Nivel de percepción sobre la pobreza en el Perú, causas y efectos sociales. Revista Universidad y Sociedad, 12(6), 46-53.

Millán-Valenzuela, H., & Pérez-Archundia, E. (2019). Educación, pobreza y delincuencia:¿nexos de la violencia en México?. Convergencia, 26(80

Ministerio de Educación. (2017). Reglamento General a la Ley Orgánica de Educación Intercultural. Quito - Ecuador.

Ortega-Gallo, M. A., Mejía-Ramirez, E. K., Uriguen-Aguirre, P. A. (2022). Pobreza en el Ecuador durante la pandemia COVID-19 y el impacto provocado en sectores sociales. Digital Publisher CEIT, 271-291. doi:https://doi.org/10.33386/593dp.2022.2.1057

Oxa Gerónimo, A. V., Loayza Lara, D. (2017). La evolución del rol del capital humano en la determinación de los ingresos en Bolivia en el período 2004-2015. Una aplicación del modelo. Revista de coyuntura y perspectiva, 2-44.

Pinilla-Roncancio, M. (2017). The reality of disability: Multidimensional poverty of people with disability and their families in Latin America. Disability and Health Journal, 1-7. doi:https://doi.org/10.1016/j.dhjo.2017.12.007

Pinilla-Roncancio, M., Mactaggart, I., Kuper, H., Dionicio, C., Naber, J., Murthy, G., Polack, S. (2020). Multidimensional poverty and disability: A case control study in India, Cameroon, and Guatemala. SSM - Population Health, 11-21. doi:https://doi.org/10.1016/j.ssmph.2020.100591

Rincón, R. (2023). Quarterly multidimensional poverty estimates in Mexico using machine learning algorithms. Estudios Económicos (México, DF), 38(1), 3-68

Villegas Q, H., Vargas R, J., Perez O, D. (2016). Impact of Education on Poverty in Bolivia. Economía Coyuntural, 33-60.

Werner, L. K., Ludwig, J.O., Sie, A., Bagagnan, C. H., Zabre, P., Vandormael, A., Fink, G. (2022). Health and economic benefits of secondary education in the context of poverty: Evidence from Burkina Faso. PLoS ONE, 1-13. doi:https://doi.org/10.1371/journal.pone.0270246