

Determinants of Parental Support for Learning among 3- to 4-Year-Old Children in Mali

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Abstract

This study analyzes the factors explaining parental support for the learning of 3- to 4-year-old children in Mali. Although parents are their children's first educators and play a crucial role in creating a learning-friendly environment, their educational involvement remains influenced by several sociodemographic, economic, and cultural factors. Using data from the 2015 MICS Mali survey, the analysis employs a descriptive approach using the chi-square test and Multiple Correspondence Analysis (MCA), supplemented by an explanatory analysis based on binomial logistic regression to identify the determinants of parental support for the learning of 3- to 4-year-old children. The findings show that parental support for learning is influenced by several factors, including geographic area, ethnicity, the child's relationship to the school principal, the mother's media exposure, and the household's standard of living. These results contribute to a better understanding of the determinants of parental support for early childhood learning and highlight the need for policies aimed at reducing geographic disparities and strengthening awareness campaigns to promote greater parental involvement in early childhood learning. They also provide a basis for future research to analyze the mechanisms by which these factors influence family parenting practices and children's developmental trajectories.

Keywords

Explanatory Factors, Parental Support, Learning, Children, Mali

1. Introduction

It is difficult to envision the future of the world without considering that of children, particularly those aged 3 to 4 years, who represent the citizens of tomorrow.

The early years of life constitute a critical period for children's cognitive, socio-emotional, and physical development (UNESCO, 2017: p. 63). During this phase, interactions between children and their family environment play a decisive role in brain development, learning abilities, and future behaviors (UNESCO, 2017: p. 73; Gressens, 2021: p. 905).

Research has shown that a stimulating environment characterized by positive social interactions and appropriate educational activities promotes children's intellectual and socio-emotional development (World Health Organization (WHO), 2006: p. 12). Conversely, limited support during early childhood may have negative consequences on academic achievement, mental health, and social integration (Institut National de Santé Publique du Québec (INSPQ), 2022: p. 45). Therefore, early interventions aimed at promoting early childhood development are recognized as among the most cost-effective investments, particularly for children from disadvantaged backgrounds (De Bodman et al., 2017: p. 9). They also provide a relevant response to challenges within primary education systems, particularly regarding school retention, grade repetition, and students' learning achievement levels. These interventions contribute to improving the internal efficiency of education systems and learners' academic performance (Institut National de Santé Publique du Québec (INSPQ), 2022: p. 47; Janus & Offord, 2007: p. 17).

Despite the recognized importance of early childhood, several challenges persist worldwide. The 2013 Global Monitoring Report on Education for All (EFA) estimated that approximately 250 million primary school-aged children were unable to acquire basic skills in reading and mathematics (UNICEF, 2016: p. 20). In low- and middle-income countries, approximately 80% of children aged 2 to 4 years are frequently exposed to violent forms of disciplinary practices. Furthermore, about 15.5 million children aged 3 to 4 years do not benefit from adult support to learn literacy, numeracy, drawing, or listening to stories.

However, some simple activities carried out by parents make a significant contribution to children's development. Storytelling, looking at pictures in books, learning to count, singing, and exploring nature stimulate children's curiosity, creativity, concentration, as well as their physical and mental development (INSTAT, 2015: p. 213). These practices therefore represent fundamental components of parental support for children's learning.

Studies on parental support for learning, although limited in the Malian context, highlight the complexity of the determinants of parental involvement. Research conducted in other sub-Saharan African countries has shown that parents' educational level, access to educational resources, and participation in early stimulation programs are significantly associated with higher levels of parental support (Nsamenang, 2008: p. 217). However, these findings cannot be fully generalized to the Malian context due to the country's specific sociocultural and economic characteristics.

In Mali, parental involvement in learning activities among children aged 3 to 4 years remains a concern. According to the MICS 2015 survey, only 5.1% of fathers

actively participate in their children's learning activities compared with 19% of mothers (INSTAT, 2015: p. 14). Furthermore, only 4.9% of girls and 5.6% of boys aged 3 to 4 years attend a preschool education program (INSTAT, 2015: p. 212). Access to educational resources is also extremely limited, as fewer than 1% of children live in households with at least three children's books (INSTAT, 2015: p. 216). Significant disparities also exist between urban and rural areas as well as across regions. Indeed, parental involvement is higher in urban areas (60%) than in rural areas (53%), reflecting inequalities related to geographical living conditions (INSTAT, 2015: p. 216).

Numerous socioeconomic, cultural, and environmental factors influence parental support for children's learning in Mali. These factors include parents' educational level, socioeconomic status, sociocultural norms, and the resources available within the family environment (Bornstein, 2002: p. 32). In addition, studies have shown that children who benefit from greater parental support generally perform better throughout their primary education (Yerbanga & Soré, 2025: p. 146). Despite some studies conducted in sub-Saharan Africa, knowledge remains limited regarding the Malian context.

Based on these observations, this study aims to analyze the explanatory factors of parental support for the learning of children aged 3 to 4 years in Mali. The specific objectives are to: describe the extent and variation of learning support among children aged 3 to 4 years according to contextual variables and child characteristics; identify the profile of children aged 3 to 4 years who benefit from parental support in their learning process; determine the mechanisms through which explanatory factors influence learning support among children aged 3 to 4 years; and rank the explanatory factors associated with parental support for children's learning.

This study is structured into three parts: 1) context and presentation of the study area, 2) data sources and methodology, and 3) study results and discussion.

2. Context and Study Area

Mali is a landlocked country in West Africa, covering an area of approximately 1,241,238 km². It shares borders with several countries in the sub-region, including Algeria to the north, Niger and Burkina Faso to the east, Côte d'Ivoire and Guinea to the south, and Mauritania and Senegal to the west. The country is characterized by significant geographical and climatic diversity, with varied landscapes including the Manding Mountains, the Bandiagara Escarpment, Mount Hombori, and the Adrar des Ifoghas mountain ranges.

The Malian population has experienced rapid demographic growth, increasing from approximately 6.9 million inhabitants in 1960 to nearly 22.4 million in 2023, with an average annual growth rate of 3.4% (INSTAT, 2024). This population is predominantly young, with more than half of the inhabitants being under 19 years of age in 2022 (RGPH5, 2022). This rapid demographic growth, combined with a high proportion of young children, places considerable pressure on household re-

sources and the education system, making access to quality education and adequate support for young children more challenging.

The country is also characterized by considerable cultural and ethnic diversity. Traditional educational practices, which vary across communities, play a crucial role in children's socialization and learning processes. Storytelling, songs, and pastoral activities contribute to the identity, social, and cultural development of young children while strengthening community ties (UNICEF, 2017).

However, several socioeconomic constraints limit parental support for children's learning. Poverty, unemployment, social inequalities, as well as food crises and economic shocks, often lead families to prioritize basic needs (food and health) over the education of their young children (IMF). In rural areas, agricultural activities occupy a large part of parents' time, reducing their availability for children's educational activities. This is compounded by difficulties in accessing safe drinking water, healthcare services, and educational resources.

Furthermore, family structures in Mali are often extended and characterized by frequent mobility between households, which also influences the quality of parental support for young children's learning. Many children do not live with both biological parents, and this situation, combined with economic difficulties and disparities between urban and rural areas, limits opportunities for effective parental support in children's learning from an early age.

3. Data Source and Methods of Analysis

3.1. Data Source

The data used in this study were obtained from the fourth Multiple Indicator Cluster Survey conducted in Mali (MICS-Mali). The survey was carried out in 2015 by the National Institute of Statistics (INSTAT), in collaboration with the Ministry of Health and the Ministry of Education through their Planning and Statistics Units (CPS), as part of the global MICS survey program. Technical assistance was provided by the United Nations Children's Fund (UNICEF). UNICEF, Population Services International (PSI Mali), the United Nations Population Fund (UNFPA), and the Malian government provided financial support for the implementation of the 2015 MICS-Mali project activities.

The MICS surveys aim to generate key indicators that enable countries to have reliable data for the development of policies and programs, as well as for monitoring the Millennium Development Goals (MDGs) and other internationally agreed commitments.

3.1.1. Target Population

The target population of this study consisted of all children aged 3 to 4 years who were included in the 2015 Multiple Indicator Cluster Survey (MICS). The initial sample comprised 6413 children aged 3 to 4 years, including 3301 boys and 3112 girls. The questionnaire for this age group was administered to women aged 15 to 49 years who had at least one child under five years of age. For the purposes of the

present analysis, only children aged 3 to 4 years were retained.

Statistical analyses were performed using Stata software. To ensure the quality and reliability of the analyses, observations with missing values for the variables of interest were excluded from the analytical dataset. After excluding observations with missing data, the final sample used for the descriptive and multivariate analyses consisted of 6345 children.

3.1.2. Weighting of the Dataset

The command `gen pond = HH7/100,000` in Stata was used to apply the sampling weights. Because certain Malian regions (such as Kidal, Gao, and Timbuktu) are frequently oversampled for security and representativeness reasons, while more populous southern regions (such as Sikasso and Ségou) may be relatively underrepresented, weighting is essential to restore the actual demographic contribution of each area. By incorporating the regional variable into the Stata survey design, the software adjusts the estimation of standard errors by taking into account the socio-economic characteristics specific to each Malian territory. This approach ensures that the estimated indicators are statistically valid and accurately reflect the reality of the entire Malian population. **Table 1** below presents the distribution of the sampling weight coefficients.

Table 1. Distribution of sampling weights.

Sampling weight	Frequency	Percentage (%)	Cumulative (%)
0.0001	1058	16.67	16.67
0.0002	1159	18.27	34.94
0.0003	768	12.10	47.04
0.0004	964	15.19	62.24
0.0005	750	11.82	74.06
0.0006	315	4.96	79.02
0.0007	503	7.93	86.95
0.0009	828	13.05	100.00
Total	6345	100.00	

Source: Authors' analysis of MICS, Mali 2015 data.

3.1.3. Sampling Process

1) Survey design

The 2015 Mali Multiple Indicator Cluster Survey (MICS) was conducted using a two-stage stratified cluster probability sampling design. The primary objective of the survey sampling design was to produce statistically reliable estimates for most indicators at the national level, for urban and rural areas, for each region of the country, and for the District of Bamako.

2) Sampling frames for the two stages

The sampling frame for the 2015 Mali Multiple Indicator Cluster Survey (MICS) was based on the enumeration area (EA) database from the 2009 General Popula-

tion and Housing Census (GPHC). Enumeration areas are geographic units comprising 500 to 800 inhabitants in rural areas and 1000 to 1500 inhabitants in urban areas. They served as the basic operational units for the implementation of the 2009 GPHC and constituted the primary sampling units (PSUs) for the 2015 Mali MICS, corresponding to the first-stage sampling frame.

The National Institute of Statistics (INSTAT) maintains a database of enumeration areas containing their geographic identifiers and information on place of residence (urban or rural), type of residence (sedentary or nomadic), number of households, total population, and number of compounds.

For the whole of Mali, 20,090 enumeration areas were defined during the 2009 GPHC. In 2009, these enumeration areas included 2,369,866 households and a population of 14,517,176 inhabitants. **Table 2** below presents characteristics of the structure of the first-stage sampling frame by region (or district) and place of residence.

Table 2. Structure of the sampling frame by region and place of residence, Mali MICS 2015.

Place of residence	Region/District	Primary sampling units	Proportion	Households	Proportion	Population	Proportion
Urban	Kayes	294	0.015	42,892	0.018	278,468	0.019
	Koulikoro	125	0.006	20,035	0.009	132,478	0.009
	Sikasso	406	0.020	66,976	0.029	427,014	0.029
	Ségou	176	0.009	31,506	0.013	200,468	0.014
	Mopti	197	0.010	34,370	0.015	199,498	0.014
	Timbuktu	97	0.005	15,132	0.006	86,435	0.006
	Gao	146	0.007	18,491	0.008	113,841	0.008
	Kidal	48	0.002	4823	0.002	25,969	0.002
	Bamako	1538	0.077	286,381	0.122	1,810,366	0.125
Urban subtotal		3027	0.151	520,606	0.222	3,274,537	0.226
Rural	Kayes	2629	0.131	262,850	0.112	1,715,147	0.118
	Koulikoro	3289	0.164	345,411	0.147	2,289,630	0.158
	Sikasso	3142	0.156	330,641	0.141	2,184,391	0.151
	Ségou	3150	0.157	356,182	0.152	2,137,881	0.147
	Mopti	3079	0.153	344,382	0.147	1,836,711	0.127
	Timbuktu	1010	0.050	106,530	0.045	588,358	0.041
	Gao	668	0.033	71,714	0.031	428,463	0.030
	Kidal	96	0.005	7820	0.003	41,770	0.003
Rural subtotal		17,063	0.849	1,825,530	0.778	11,222,351	0.774
National total		20,090	1.000	2,346,136	1.000	14,496,888	1.000

Source: Multiple Indicator Cluster Survey (MICS), Mali, 2015.

3) Study domains and sampling strata

For the 2015 Mali Multiple Indicator Cluster Survey (MICS), the study domains consisted of the regions of Kayes, Koulikoro, Sikasso, Ségou, Mopti, Timbuktu, and Gao, as well as the District of Bamako. The Kidal region was excluded because it was not fully accessible due to security reasons.

The stratification criterion used for the survey was place of residence, which resulted in the definition of fifteen strata across the eight study domains. The table below presents selected characteristics of the first-stage sampling frame according to the study domains and sampling strata.

Table 3 presents the results of the calculation of the minimum required sample size (n) for a study domain using national data. For a set of seven indicators, the calculated sample size (n) is presented in the penultimate row of the table, while the household sample size for all eight study domains is presented in the last row.

Table 3. Minimum required household sample size (n) by study domain for selected indicators, Mali MICS 2015.

Variable	Exclusive breastfeeding (<6 months)	Stunting prevalence	Antenatal care coverage (at least four visits)	Oral rehydration therapy (ORT) with continued feeding	Hepatitis B vaccination coverage	Underweight prevalence	Wasting prevalence
r in 2010	0.2044	0.2781	0.3494	0.3232	0.2691	0.1890	0.0886
r	0.2044	0.2750	0.3494	0.3232	0.3000	0.1690	0.0860
Design effect (deff)	1.4595	2.1847	2.3504	1.8840	2.5692	2.1740	1.4465
Response rate (RR)	0.970	0.970	0.970	0.970	0.970	0.970	0.970
Average household size (AveSize)	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Proportion of eligible population (pb)	0.0225	0.1850	0.2200	0.1850	0.0305	0.1850	0.1625
Minimum required sample size (n)	11,662	1438	919	985	9078	2669	4370
Sample size for eight study domains	93,295	11,504	7351	7880	72,627	21,351	34,957

Source: Multiple Indicator Cluster Survey (MICS), Mali 2015.

4) Household sample size

The 2015 Mali Multiple Indicator Cluster Survey (MICS) was designed to measure a large number of indicators related to the living conditions of children and women. For a given level of estimation precision and a given sampling design, a specific sample size is required for each indicator. This represents the minimum sample size needed to achieve the desired level of precision, corresponding to a relative error of 12%. Therefore, each indicator has its own minimum required sample size. However, since the survey uses a single sample to estimate all indicators, the largest minimum sample size among the indicators considered is selected. In practice, the minimum sample sizes required for several indicators are examined, and the final sample size is selected based on the one that best fits the survey

budget.

The following formula was used to determine the minimum required sample size (n) for the selected target indicator in each study domain:

$$n = \frac{4r(1-r)(deff)}{(0.12r)^2(pb)(AveSize)(RR)}$$

where:

n is the required sample size, expressed as the number of households; 4 is an approximation of the square of 1.96, where 1.96 is the factor corresponding to a 95% confidence level (i.e., the 0.975 quantile of the standard normal distribution); r is the predicted or expected value of the indicator, expressed as a proportion; $deff$ is the design effect associated with the indicator, estimated from a previous study or using a default value of 1.5; $0.12r$ is the allowable margin of error at the 95% confidence level, defined as 12% of the value of r (relative margin of error for r); pb is the proportion of the total population on which the indicator r is based; $aveSize$ is the average household size (average number of persons per household); and RR is the expected overall response rate.

To determine the required sample size n , data from the 2010 MICS4 survey, the 2009 General Population and Housing Census (GPHC), and the 2013 Standardized Monitoring and Assessment of Relief and Transitions (SMART) survey were used.

3.2. Dependent and Independent Variables

3.2.1. Dependent Variable

The dependent variable is parental support for the learning of children aged 3 to 4 years. It is measured using a binary indicator: “Yes” if the child received parental support during the three days preceding the interviewer’s visit, and “No” otherwise.

In this study, the analysis of parental support focused on three specific dimensions: reading, storytelling, and naming/counting activities involving objects. In contrast, certain practices such as singing songs, playing with the child, and taking the child for a walk, which are often performed instinctively and naturally, were excluded because they generally reflect daily and spontaneous interactions within the African context. This approach makes it possible to better target forms of support that require explicit intervention or structured engagement.

For each activity, the questionnaire identifies the person who participated with the child (mother, father, or another household member). This information makes it possible to assess the involvement of different household members in providing parental support.

The main question used to measure this variable is formulated as follows (**Table 4**).

Each of these activities plays a crucial role in children’s cognitive and emotional development, highlighting the importance of parental involvement in the learning process.

Table 4. Variables used for the construction of the dependent variable.

During the past three days, have you, or any other household member aged 15 years or older, participated with (name) in any of the following activities? If yes, ask: Who participated in this activity with (name)? Circle all responses mentioned.		Mother	Father	Other	No one
[A] Read books or looked at picture books with (name)?	Read books	A	B	X	Y
[B] Told stories to (name)?	Storytelling	A	B	X	Y
[C] Sang songs to (name) or with (name), including lullabies?	Singing songs	A	B	X	Y
[D] Took (name) outside the home, residence, yard, or compound for a walk?	Taking a walk	A	B	X	Y
[E] Played with (name)?	Playing	A	B	X	Y
[F] Named, counted, and/or drew things for or with (name)?	Naming/ Counting	A	B	X	Y

Source: Authors' analysis of MICS, Mali 2015 data.

To facilitate data analysis, parental support was grouped into two simple categories: “0” indicating the absence of parental support and “1” indicating the presence of parental support. This transformation makes it possible to simplify the initially complex variable into a binary variable, thereby making the assessment of the influence of parental support on children’s learning more accessible and clearer. This approach aims to establish meaningful relationships between parental engagement and children’s educational progress, contributing to a better understanding of their development.

3.2.2. Independent Variables

1) Contextual Variables

- Geographical areas consist of three major regions: North, Central, and South-West, distributed across the eight administrative regions and the country’s capital. The North includes the regions of Kidal, Timbuktu, and Gao, which are characterized by a desert climate and nomadic populations, with limited access to education. The Central area, including part of Mopti and Ségou, has a more temperate climate and agricultural lands, providing better educational infrastructure, although significant challenges remain. Finally, the South-West, which includes Bamako, Koulikoro, Sikasso, and Kayes, is the most fertile area, characterized by a humid tropical climate and better access to educational resources. This classification helps to understand educational dynamics and variations in parental support according to regional specificities.

- Place of residence refers to the environment in which children’s parents live at the time of the survey. In the context of parental support for the learning of children aged 3 to 4 years in Mali, this concept is particularly important because it significantly influences educational opportunities. It was recoded into two categories: urban and rural.

2) Household Characteristics Variables

- Household wealth status is a key factor determining a household's ability to provide essential resources for children's learning, such as books, educational games, and extracurricular activities. To facilitate the analysis, this variable was categorized into three groups: a) Low, b) Medium, and c) High.

- Household size refers to the number of individuals living together at the time of the survey. The larger the household, the more difficult it becomes to meet the needs of all household members. This situation may increase household responsibilities and limit parental support for the learning of children aged 3 to 4 years. This variable was categorized based on the average household size in Mali as follows: "small household size" for households with fewer than 7 members, "medium household size" for those with 7 to 11 members, and "large household size" for households with 12 or more members.

- Educational attainment: this variable was grouped into three categories: "No education," "Primary education," and "Secondary education or higher."

3) Variables Related to Household Head Characteristics

- Sex of the household head: The literature review indicates that the sex of the household head may influence the support provided for children's learning, whether they are girls or boys. The analysis of this variable makes it possible to explore the specific situation in Mali. This variable consists of two categories: "Male" and "Female."

- Ethnicity of the household head: The ethnicity of the household head plays an important role in parental support for the learning of children aged 3 to 4 years in Mali, influencing both educational practices and the resources available within households. This variable was categorized into four groups: "Bambara/Malinké/Soninké," "Fulani/Tuareg/Songhai," "Senoufo/Minianka/Bobo/Dogon," and "Others."

- Religion of the household head: The religion of the household head may also influence the household's tendency to support either girls or boys. It is important to note that this variable was selected to capture potential differences in parental support behaviors. This variable was recoded into three categories: "Muslim," "Christian," and "Other."

4) Variables Related to Individual Characteristics of the Mother

- Mother's age: The mother's age may be a distinguishing factor regarding parental support for the learning of children aged 3 to 4 years within the household. It was recoded into three age groups: "15 - 29 years," "30 - 39 years," and "40 - 49 years."

- Mother's marital status: Different family contexts may influence the way parents are involved in the education of their young children. Marital status was recoded as follows: single, married, and divorced/separated/widowed.

- Mother's level of media exposure: This refers to the frequency with which mothers access media content such as newspapers, television, and radio, and how this exposure influences their ability to support the learning of their children aged

3 to 4 years in Mali. This variable was categorized into four groups: high exposure, moderate exposure, low exposure, and no exposure.

5) Variables Related to Individual Characteristics of the Child

- **Child's age:** This refers to the age of children as reported at the time of the survey. The analysis distinguishes between children aged "3 years" and those aged "4 years."

- **Child's sex:** This variable makes it possible to examine potential gender-based disparities, either in favor of boys or girls, regarding parental support for the learning of children aged 3 - 4 years. This variable was categorized as follows: a) male child and b) female child.

- **Child's relationship to the household head:** This variable refers to the relationship between the child living in the household and the person identified as the household head. It was recoded into three categories: "child of the household head," "related to the household head," and "not related to the household head."

- **Participation in an early childhood development program:** Children who participate in educational learning programs or early childhood classes are exposed at an early age to structured activities that promote their cognitive, social, and emotional development. This variable has two categories: "Yes" and "No."

- **Child's birth order:** Birth order is a common parameter in demographic analysis. It indicates the position occupied by a child in the sequence of births within a woman's offspring. This variable was recoded into three categories: "First birth order," "Second birth order," and "Third birth order or higher."

- **Child health status:** Although less frequently studied and documented in the literature compared with other determinants, child health status is an important factor that may influence school enrollment from an early age. Adequate nutrition, combined with good hygiene practices, not only promotes children's physical, cognitive, and psychosocial development but also improves their school readiness, thereby increasing their likelihood of being enrolled in an early childhood education program. According to [Jaramillo and Tietjen \(2002\)](#), nutritional deficiencies, inadequate health care, an unstimulating preschool environment, and limited parental knowledge about young children's developmental needs may lead to delays in physical, cognitive, and psychosocial development. These shortcomings also increase the risk of health problems and reduce children's readiness to enter the education system under favorable conditions.

In the present study, this variable was measured as a dichotomous variable with two response categories: Yes and No. To assess children's health status through their ability to engage in social interactions, respondents were asked the following question: "*During the reference period, was the child often too sick to play or interact normally with other children?*".

3.3. Methods of Analysis

This study is based on an analytical approach combining descriptive and explanatory analyses, in line with the research objectives.

3.3.1. Descriptive Analysis

The descriptive analysis was conducted through bivariate analysis and Multiple Correspondence Analysis (MCA).

1) Bivariate Analysis

Bivariate analysis aims to identify potential associations between the outcome variable and each independent variable. The chi-square test was used to assess the existence of differences between the various categories regarding the occurrence of the phenomenon represented by the study variable. A significance level of 5% was used to evaluate the association between the dependent and independent variables.

When the probability associated with the chi-square test is lower than the selected significance threshold (5%), the variables are considered to be associated; otherwise, they are considered independent.

It is important to emphasize that the associations identified at this stage may be misleading in a multivariate context, as independent variables are analyzed separately. Indeed, this method does not allow the detection of interaction effects between factors that may influence these relationships.

2) Multiple Correspondence Analysis (MCA)

Multiple Correspondence Analysis (MCA) is a multivariate method used to explore associations not only between independent variables and the dependent variable but also among the independent variables themselves. It makes it possible to describe the underlying structure of all categorical variables. MCA helps refine the results obtained from bivariate analysis.

Given the large number of variables included in this analysis, MCA was used to better characterize children who do not benefit from parental support in their learning process.

To this end, the first two principal factorial axes were characterized, and the factorial plane was then analyzed to refine the typology and establish the profile of children who do not receive parental support within their households.

3.3.2. Explanatory Analysis

To better understand parental support for children's learning within the household, a binary logistic regression model was used, given that the dependent variable is qualitative and dichotomous. This method makes it possible to identify the factors influencing parental support for children's learning, as well as the mechanisms through which these factors operate.

The dependent variable takes two values:

- "Yes" when parental support for children's learning is present;
- "No" when parental support for children's learning is absent.

Let p represent the probability that the event occurs, that is, the probability that a child aged 3 - 4 years receives parental support for learning, and $1 - p$ represents the probability that the child does not receive such support. The logistic regression model allows the following equation to be formulated:

The logistic transformation is expressed as follows:

$z = \log\left(\frac{p}{1-p}\right)$, which can be expressed in the following linear form:

$z = \beta_0 + \beta_1 \cdot X_1 + \beta_2 \cdot X_2 + \beta_3 \cdot X_3 + \dots + \beta_n \cdot X_n$ where $\beta_0, \beta_1, \beta_2, \beta_3, \dots, \beta_n$ represent the regression coefficients of the model. It can also be expressed in a multiplicative form:

$e^z = \frac{1}{1-p}$ with $z = \frac{1}{1+e^z}$ et X_i (pour $i = 1, 2, 3, \dots, n$) Representing the inde-

pendent variables. In this context, z denotes the dependent variable.

The term β_0 represents the intercept of the equation, expressing the average level of the outcome for all values of the independent variables (X_i), while β_i represents the coefficients associated with each independent variable (X_i).

The statistic $e^z = \frac{1}{1-p}$ corresponds to the odds ratio, which measures the effect of each independent variable on the likelihood of the occurrence of the event.

It should be noted that, in addition to odds ratios, logistic regression provides the number of observations, the probability associated with the chi-square test of the model, the significance level for each parameter (regression coefficients β or odds ratios), as well as the confidence intervals of the parameters for each category of the variables included in the model.

3.4. Interpretation of Results

The assessment of the model's goodness of fit is based on the chi-square probability. If this probability is lower than the predefined significance threshold, it indicates that the model is statistically adequate. This means that the independent variables considered jointly explain the variation in the dependent variable and can therefore predict the value of z .

Furthermore, logistic regression provides the odds ratio associated with the event under study, which is used for the interpretation of results. This method is essentially probabilistic and produces regression coefficients (β_i) from which the Odds Ratios (OR), or odds ratios ($\exp(\beta)$), are calculated.

The odds ratio is interpreted in relation to a reference category. Thus, an OR greater than 1 for a given category indicates a higher probability that a child receives parental support for learning compared with the reference group. Conversely, an OR lower than 1 indicates a lower probability that a child receives parental support for learning in the considered category compared with the reference group. The significance level was set at 5% in this study.

Presentation of the Analytical Models

1) Multicollinearity Test

The problem of multicollinearity occurs when two or more independent variables are highly correlated with each other. This situation makes it difficult to isolate their individual effects on the dependent variable. If this issue is not addressed, it leads to an increase in the variance of the estimators, resulting in excessively wide confidence intervals and reducing the reliability of predictions for

the dependent variable. The results of the analysis can only be considered valid if this problem has been adequately addressed.

In this study, the Variance Inflation Factor (VIF) is the statistical method used to identify potential correlations among the explanatory variables. A multicollinearity problem is considered to exist when the VIF value of a variable is greater than or equal to 10 and/or when the average VIF value is greater than or equal to 2.

If this condition is not met, the impact of multicollinearity is considered negligible and all independent variables can be included in the analysis. However, when two variables are strongly correlated, one of them is excluded while the other is retained based on its theoretical relevance.

The results of the test show that the average VIF calculated for the independent variables is 1.28, which is below the threshold of 2, and that the VIF value for each individual variable is below 10 (see **Table 5** below). Therefore, there is no evidence of multicollinearity among the independent variables.

Table 5. Variance Inflation Factors (VIF) of the explanatory variables in the regression model.

Variables	VIF	1/VIF
Place of residence	1.72	0.581
Geographic area	1.31	0.763
Sex of household head	1.17	0.854
Ethnicity of household head	1.11	0.898
Religion of household head	1.04	0.959
Mother's media exposure level	1.30	0.771
Household size	1.73	0.578
Parents' level of education	1.37	0.731
Household wealth status	2.03	0.492
Mother's age	1.04	0.963
Mother's marital status	1.18	0.846
Child's age	1.02	0.984
Child's sex	1.00	0.997
Participation in early childhood program	1.15	0.870
Birth order	1.14	0.880
Child's health status	1.01	0.989
Mean VIF	1.28	

Source: Authors' analysis of MICS, Mali 2015 data.

2) Model Description

To conduct the planned explanatory analyses, a stepwise approach to binary logistic regression was adopted. This approach makes it possible to better understand how the different factors influence the outcome variable. Accordingly, several models were estimated by progressively introducing explanatory variables according to conceptual blocks. In total, 17 stepwise regression models were developed. The order of variable inclusion is summarized as follows:

- Model 0 (M0): Gross effects
- Model 1 (M1): M0 + Place of residence
- Model 2 (M2): M1 + Geographic area
- Model 3 (M3): M2 + Household wealth status
- Model 4 (M4): M3 + Parents' level of education
- Model 5 (M5): M4 + Sex of household head
- Model 6 (M6): M5 + Ethnicity of household head
- Model 7 (M7): M6 + Religion of household head
- Model 8 (M8): M7 + Household size
- Model 9 (M9): M8 + Mother's age
- Model 10 (M10): M9 + Mother's marital status
- Model 11 (M11): M10 + Mother's media exposure level
- Model 12 (M12): M11 + Child's age
- Model 13 (M13): M12 + Child's sex
- Model 14 (M14): M13 + Child's relationship to the household head
- Model 15 (M15): M14 + Birth order
- Model 16 (M16): M15 + Participation in an early childhood program
- Model 17 (M17): M16 + Child's health status

3) Goodness of Fit of the Binary Logistic Regression Model

To assess model fit, both the chi-square test and the pseudo R^2 statistic were used. The results of the saturated binary logistic regression model show that the chi-square probability is lower than 5% (0.000). This indicates that, taken together, the variables included in the model explain the variation in the dependent variable.

- Assessment of model fit using pseudo- (R^2) statistics

The goodness-of-fit of the logistic regression model was assessed using McFadden's pseudo- (R^2) , which was estimated at 0.1015. This statistic provides a measure of the model's explanatory performance, although it should be complemented by an assessment of model calibration.

- Standardized assessment of model fit

For this purpose, the Hosmer-Lemeshow goodness-of-fit test was performed using ten groups of predicted probabilities. The results obtained ($\chi^2 = 4.37$; $p = 0.8218$) indicate excellent agreement between the observed frequencies and the frequencies predicted by the model. This satisfactory calibration confirms that the model fits the data well, allowing a reliable interpretation of the determinants of parental support across the entire sample ($n = 6345$) (**Table 6**).

Table 6. Hosmer-lemeshow goodness-of-fit test.

Group	Predicted probability	Observed (Outcome = 1)	Expected (Outcome = 1)	Observed (Outcome = 0)	Expected (Outcome = 0)	Total
1	0.3966	244	233.9	391	401.1	635
2	0.4271	262	261.5	372	372.5	634
3	0.4493	276	278.6	359	356.4	635
4	0.4687	282	291.0	352	343.0	634
5	0.4880	295	304.7	342	332.3	637
6	0.5075	311	314.7	321	317.3	632
7	0.5293	342	329.2	293	305.8	635
8	0.5582	334	343.8	300	290.2	634
9	0.6029	379	367.9	256	267.1	635
10	0.7935	411	410.9	223	223.1	634

Source: Authors' analysis of MICS 2015 data.

Statistical summary

Number of observations: 6 345

Number of groups: 10

Hosmer-Lemeshow $\chi^2(8)$: 4.37

Prob > χ^2 : 0.8218

4) Classification Test

The classification test evaluates the explanatory power of the model by computing the concordance and discordance between predicted and observed values. The number of correct predictions is found on the diagonal of the classification matrix. Estimated probabilities are classified as 1 if they are greater than or equal to the 50% threshold, and 0 otherwise.

Thus, when the proportion of correct predictions exceeds 50%, the model is considered capable of predicting the studied phenomenon.

In this study, the full (saturated) model achieves a correct prediction rate of 59.75%. Since this proportion is higher than the 50% threshold (see **Table 7**), it can be concluded that the model is able to predict parental support for the learning of children aged 3 - 4 years.

Table 7. Classification results of the full models.

Classified	True D	True ~D	Total
+	1739	1157	2896
–	1397	2052	3439
Total	3136	3209	6345

Classified positive if predicted $\Pr(D) \geq 0.5$
True D defined as Parental_Support! = 0

Continued

Sensitivity		Pr (+ D)	55.45%
Specificity		Pr (- ~D)	63.95%
Positive predictive value		Pr (D +)	60.05%
Negative predictive value		Pr (~D -)	59.50%
False + rate for true ~D		Pr (+ ~D)	36.05%
False – rate for true D		Pr (- D)	44.55%
False + rate for classified	+	Pr (~D +)	39.95%
False – rate for classified	-	Pr (D -)	40.50%
Correctly classified			59.75%

Source: Authors' analysis of MICS, Mali 2015 data.

5) Model Fit Test

To assess the model's discriminative power, the Receiver Operating Characteristic (ROC) curve was used to evaluate the explanatory performance of the model obtained through the *Iroc* procedure. The area under the ROC curve (AUC) measures the level of concordance and discordance between observed and predicted values.

The interpretation rules of the ROC area are as follows: graphically, the further the ROC curve deviates from the diagonal line (bisector), the better the model's discriminatory ability. More specifically, the ROC analysis consists of plotting the model's classification performance across different decision thresholds. The resulting curve is known as the ROC curve, and its area under the curve provides an estimate of the overall effectiveness of the model.

The AUC is interpreted as follows:

- AUC < 0.5: the test has no informative value;
- AUC = 0.5: no discriminatory power;
- $0.6 \leq \text{AUC} < 0.8$: acceptable discrimination;
- $0.8 \leq \text{AUC} < 0.9$: excellent discrimination;
- AUC ≥ 0.9 : outstanding discrimination.

Based on the obtained AUC value, the model shows an acceptable level of discriminatory power. The area under the ROC curve is equal to 0.6370 (see **Figure 1**), which is above the 0.6 threshold. Therefore, the model exhibits a moderate level of discrimination. This result may be explained by the inclusion of a limited set of explanatory variables, some of which may not fully capture all relevant determinants of parental support for children's learning.

3.5. Ranking of Determinants

After identifying the explanatory factors of parental support for the learning of children aged 3 to 4 years in Mali, it is relevant to rank these factors according to their contribution to explaining the studied phenomenon. This ranking makes it possible to better assess the relative contribution of each factor to the understand-

ing of parental support.

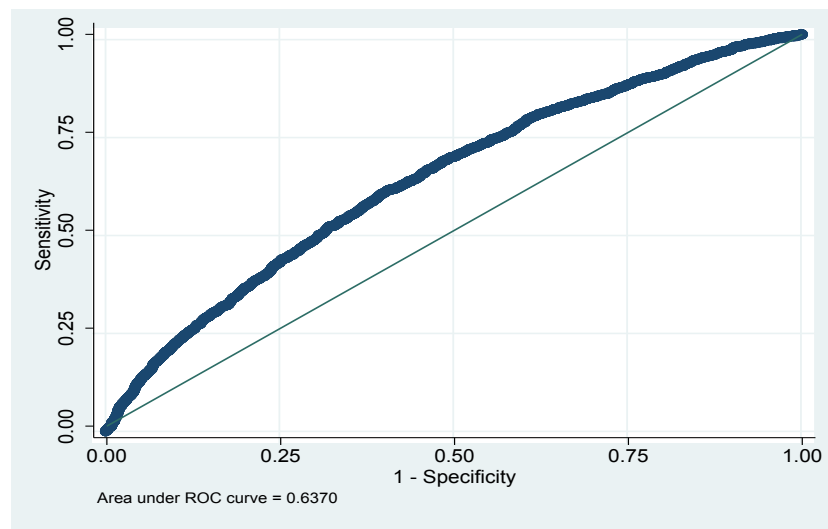


Figure 1. ROC Curve Illustrating the Model's Discriminatory Power. Source: Authors' analysis of MICS, Mali 2015 data.

The relevance of this approach lies in its ability to facilitate priority setting in decision-making and policy interventions, particularly with regard to programs and policies aimed at promoting children's learning. Furthermore, it is essential to examine, among the factors significantly associated with parental support for learning, those that best explain the phenomenon in order to effectively guide future actions.

The absolute contribution of each variable was computed using the following formula:

$$c_i = \frac{x_f^2 - x_f^2 - i}{x_f^2} * 100$$

C_i : contribution of the independent variable (X_i);

x_f^2 : chi-square value of the full model;

$x_f^2 - i$: chi-square value of the full model without the independent variable (X_i).

The higher the relative contribution (C_i) of an independent variable, the greater its explanatory power within the model compared to the other explanatory variables.

4. Results

4.1. Distribution of Children According to Parental Support for Learning among Children Aged 3 to 4 Years in Mali

The analysis shows that the proportion of children aged 3 to 4 years who do not receive any parental support for learning is slightly higher (51.1%) than that of children who receive support in at least one activity (48.9%) (**Figure 2**). However, these proportions vary according to place of residence, the availability of learning materials for the child, as well as certain characteristics related to the household,

parents, and the child.

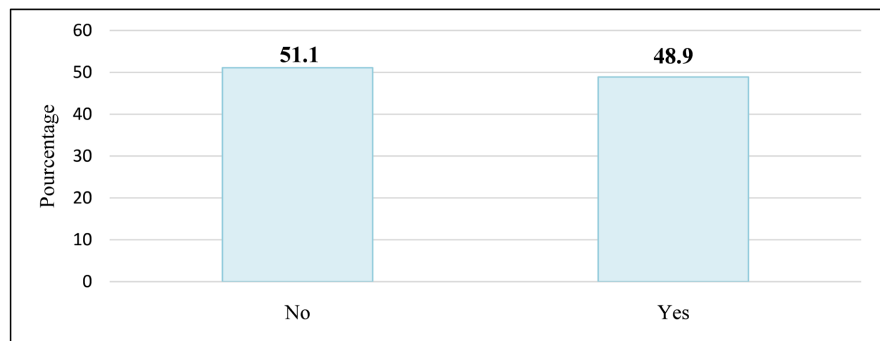


Figure 2. Distribution (%) of Children Aged 3 to 4 Years According to Parental Support for Learning. Source: Authors' analysis of MICS 2015 data.

4.2. Relationship between Parental Support and Household, Household Head, Mother, and Child Characteristics

4.2.1. Relationship between Parental Support and Household Characteristics

Place of residence and geographic region provide information on the child's geographical location. These variables are significantly associated with parental support for children's learning, as residence and region reflect an unequal distribution of such support. Children living in rural areas are less likely to benefit from parental support for learning (46.58%) than those living in urban areas (57.23%). Similarly, children in the Central region are the least likely to receive parental support (36.64%) compared to those in the South-West (50.92%) and the North (65.16%).

Household wealth status reflects the economic level of the child's household and its ability to acquire learning materials. Children living in wealthier households are more likely to benefit from parental support for learning. The results in **Table 8** show that 47.95% of children from low-wealth households receive parental support, compared to 45.03% of those from wealth households and 59.64% of those from high-wealth households.

Household size reflects the type of household in which the child lives and the level of parental support provided. Children living in large households are less likely to benefit from parental support for learning. The results indicate that 42% of children in large households receive parental support, compared to 46.98% in medium-sized households and 51.64% in small households.

Parents' level of education is also associated with parental support for children's learning. Education is considered a form of knowledge acquisition that enables parents to transmit skills to their children through involvement in their learning. The analysis by parental education level shows that 54.53% of children whose parents have a primary level of education receive parental support, followed by 48.79% for those whose parents have secondary or higher education, and 48.01% for children whose parents have no formal education.

Table 8. Household characteristics of children receiving parental support for learning.

Variables	Proportions
<i>Region of residence</i>	
Southwest	50.92
Center	36.64
North	65.16
<i>Place of residence</i>	
Urban	57.23
Rural	46.58
<i>Wealth index</i>	
Low	47.95
Medium	45.03
high	59.64
<i>Household size</i>	
Small size	51.64
Medium size	46.98
Large size	42
<i>Niveau d' instruction des parents</i>	
No level	48.01
Primary	54.53
Secondary and above	48.79

NB: ns= = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level. Source: Authors' analysis based on MICS, Mali 2015 data.

4.2.2. Relationship between Parental Support and Household Head Characteristics

Ethnic affiliation plays a significant role in parental support for children's learning, highlighting disparities among ethnic groups. Children belonging to the Bambara/Malinké/Soninké and Peulh/Touareg/Sonraï ethnic groups are more likely to receive parental support, with rates of 46.97% and 57.13%, respectively, compared with 43.95% among children from the Senoufo/Minianka/Bobo/Dogon groups and 37.56% among children from other ethnic groups.

The religion of the household head is also associated with parental support for children's learning (Table 8). The analysis shows that 49.19% of children living in households headed by a Muslim benefit from parental support in their learning, compared with 42.38% of children from households headed by individuals of other religious affiliations.

The gender of the household head is associated with parental support for children's learning. Indeed, 48.59% of children receiving such support live in households headed by men, compared with 55.22% of children living in female-headed households (Table 9).

Table 9. Characteristics of the head of household among children receiving parental support.

Variables	Proportions
Ethnicity of the household head	
Bambara/Malinké/Soninké	46.97
Peulh/Touareg/Sonraï	57.13
Senoufo/Minianka/Bobo/Dogon	43.95
Other ethnic groups	37.56
Religion of the head household	
Muslim	49.19
Other religions	42.38
Sex of the head of household	
Male	48.59
Female	55.22

Note: ns = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level. Source: Authors' analysis based on MICS 2015 data.

4.2.3. Relationship between Parental Support and Individual Characteristics of the Mother

The mother's age may constitute a factor influencing parental support for children's learning. **Table 10** shows an interesting relationship between mothers' age and parental support for their children's learning. The results indicate that 50.53% of middle-aged mothers, i.e., those aged 30 to 39 years, provide learning support to their children. This proportion decreases slightly among younger mothers aged 15 to 29 years, with 48.30% providing parental support. Older mothers, aged 40 to 49 years, are the least likely to provide parental support to their children, with a proportion of 48.14%.

The mother's marital status is also associated with parental support for children's learning, as it may provide women with a certain level of stability and enable them to devote time to their children's education. The findings show that single mothers are the most likely to provide parental support for their children's learning (54.69%), followed by mothers in monogamous marriages (50.52%), those who are divorced, separated, or widowed (47.83%), and mothers in polygamous unions (46.99%).

Media exposure is associated with parental support for children's learning. Indeed, access to media may contribute to greater awareness of the importance of providing learning support to children. However, high levels of media exposure may also reduce the amount of time mothers devote to supporting their children's schooling. The analysis shows that 56.25% of children whose mothers are not exposed to media receive parental support for learning. This proportion decreases to 49.66% among children whose mothers have low media exposure, then to 45.73% among those whose mothers have moderate exposure, and to 45.60%

among children whose mothers have high media exposure.

Table 10. Characteristics of mothers with children receiving parental support.

Variables	Proportions
Mother's age	
15 - 29 years	48.30
30 - 39 years	50.53
40 - 49 years	48.14
Woman's marital status	
Single	54.67
Monogamous marriage	50.52
Polygamous marriage	46.99
Divorced/Separated/Widowed	47.83
Mother's level of media exposure	
Not exposed	56.25
Low exposure	49.66
Moderate exposure	45.73
High exposure	45.60

Note: ns = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level. Source: Authors' analysis based on MICS 2015 data.

4.2.4. Relationship between Parental Support and Individual Characteristics of the Child

The results reveal an association between the child's relationship with the household head and parental support for learning (**Table 11**). Children living with the household head receive parental support for their learning more frequently. Indeed, the data show that 52.33% of children who are the household head's own children benefit from such support, compared with 41.75% among children related to the household head. Conversely, only 46.29% of children with no family relationship to the household head receive this type of support.

The child's birth order is also associated with parental support for learning. First-born children are those who benefit most from parental support. Specifically, 52.84% of first-born children receive parental support, compared with 48.95% of second-born children and 47.21% of children of third birth order or higher.

Participation in an early childhood development program enables children to acquire new knowledge and reflects the extent of support provided to them. The analysis shows that children participating in such program are more likely to receive parental support (64.43%) compared with those who do not participate (48.53%).

The child's health status is associated with parental support for children's learning. The findings show that the level of parental support is significantly higher

among children in good health (50.27%) compared with those in poor health (47.70%). This statistically significant difference indicates that the child's health status is an important factor influencing the extent of parental support provided for learning.

The child's age and sex are not significantly associated with parental support for learning. The proportion of children receiving learning support is observed to increase slightly with age. Indeed, 48.38% of 3-year-old children benefited from such support, compared with 49.56% of 4-year-old children. Similarly, the proportion of children receiving parental learning support is higher among boys (49.67%) than among girls (48.09%).

Table 11. Individual characteristics of children receiving parental support.

Variables	Proportions
Child's age	
3 years	48.38
4 years	49.56
Child's sex	
Boy	49.67
Girl	48.09
Relationship with the household head	
Child of the household head	52.33
Related to the household head	41.75
Not related to the household head	46.29
Child's birth order	
First birth order	52.84
Second birth order	48.95
Third birth order and above	47.21
Participation in an early childhood development programme	
Yes	63.43
No	48.53
Child's health status	
Yes	47.70
No	40.27

Note: ns = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level. Source: Authors' analysis based on MICS, Mali 2015 data.

4.3. Profile of Children Aged 3 - 4 Years Receiving Parental Support: An Analysis Using MCA

The analysis of the profile of children aged 3 to 4 years according to whether or not they receive parental support for learning reveals two groups of children (**Fig-**

ure 3).

The first group consists of children who received parental support in at least one learning activity. These children live in urban areas and belong to small-sized households with a high standard of living, often headed by women, mainly located in the South-West region. They are born to mothers in monogamous marriages, who are not exposed to media, and whose parents (father/mother) have primary, secondary, or higher levels of education. These children are generally either children of the household head or not related to the household head. They also participate in an educational programme and mainly belong to the Bambara/Malinké/Soninké ethnic group.

The second group comprises children who do not receive any parental support for learning. These are mainly children living in rural areas, in large- and medium-sized households with low living standards, located in the Central and Northern regions. These children are born to mothers in polygamous unions, highly exposed to media, and whose parents (father/mother) have no formal education. They are generally related to the household heads and mainly belong to the Peulh/Touareg/Sonraï ethnic group.

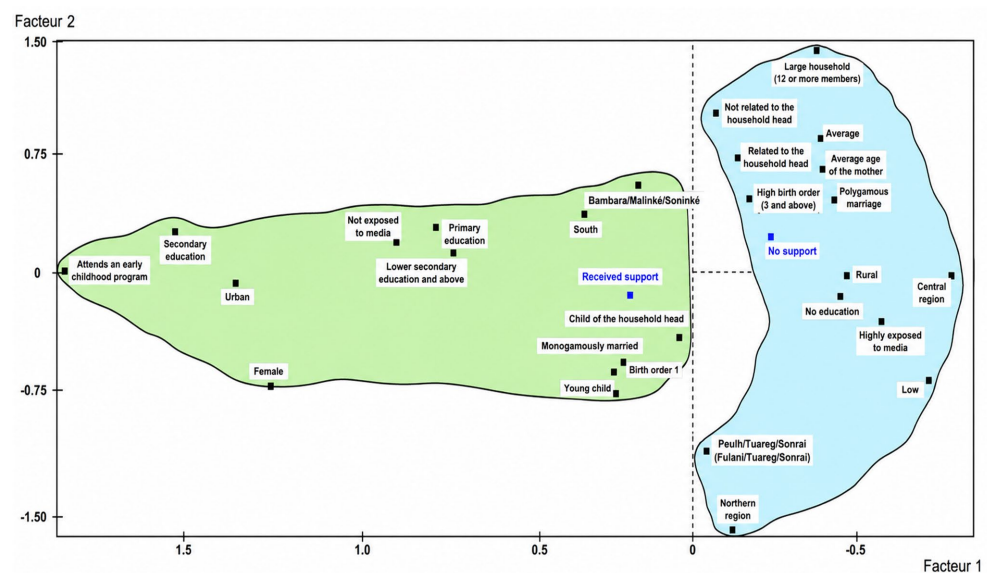


Figure 3. Profile of 3 - 4-year-old children by parental support for learning.

4.4. Explanatory Factors of Parental Support for Learning among Children Aged 3 - 4 Years in Mali

4.4.1. Contribution of Household-Related Variables

Table 12 presents the crude and adjusted effects of household-related variables on parental support for learning among children aged 3 to 4 years. Among the household-related variables, place of residence and household size remained statistically non-significant in the final model. Geographic area and household wealth status were identified as significant determinants of parental support for learning among children aged 3 - 4 years, with a significance level of 5%.

Table 12. Crude and adjusted effects of household-related independent variables on parental support for learning among children aged 3 - 4 years in Mali.

Explanatory variable	Gross effects (odds ratio)		Net effect (odds ratio)															
	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17
Place of residence																		
Urban	1.535 (***)	1.535 (***)	1.353 (***)	1.084 (ns)	1.098 (ns)	1.092 (ns)	1.089 (ns)	1.087 (ns)	1.053 (ns)	1.051 (ns)	1.046 (ns)	1.016 (ns)	1.016 (ns)	1.018 (ns)	1.002 (ns)	0.997 (ns)	0.983 (ns)	0.978 (ns)
Rural	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Geographic area																		
Southwest	Ref		Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Center	0.558 (***)		0.598 (***)	0.601 (***)	0.604 (***)	0.604 (***)	0.599 (***)	0.598 (***)	0.597 (***)	0.596 (***)	0.596 (***)	0.606 (***)	0.606 (***)	0.606 (***)	0.620 (***)	0.620 (***)	0.613 (***)	0.614 (***)
North	1.803 (***)		1.844 (***)	1.869 (***)	1.875 (***)	1.861 (***)	1.645 (***)	1.643 (***)	1.629 (***)	1.630 (***)	1.634 (***)	1.686 (***)	1.686 (***)	1.686 (***)	1.662 (***)	1.664 (***)	1.690 (***)	1.695 (***)
wealth level																		
low	Ref			Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Medium	0.889 (**)			0.888 (*)	0.888 (*)	0.890 (*)	0.918 (ns)	0.916 (ns)	0.938 (ns)	0.940 (ns)	0.942 (ns)	0.888 (*)	0.888 (*)	0.888 (*)	0.894 (*)	0.894 (*)	0.885 (*)	0.885 (*)
high	1.604 (***)			1.426 (***)	1.456 (***)	1.461 (***)	1.503 (***)	1.502 (***)	1.547 (***)	1.550 (***)	1.549 (***)	1.344 (***)	1.344 (***)	1.341 (***)	1.328 (***)	1.332 (***)	1.297 (**)	1.295 (**)
Parents' level of education																		
No level	Ref				Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Primary	1.251 (**)				1.084 (ns)	1.080 (ns)	1.085 (ns)	1.086 (ns)	1.083 (ns)	1.088 (ns)	1.088 (ns)	1.072 (ns)	1.072 (ns)	1.072 (ns)	1.090 (ns)	1.086 (ns)	1.078 (ns)	1.076 (ns)
Secondary and above	0.868 (**)				0.866 (**)	0.845 (**)	0.847 (**)	0.847 (**)	0.849 (**)	0.853 (**)	0.854 (**)	0.845 (**)	0.845 (**)	0.847 (**)	0.927 (**)	0.923 (**)	0.900 (**)	0.898 (**)

Note: ns = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level; Ref = reference category. Source: Authors' analysis based on MICS 2015 data.

Children living in the Central geographic area had 39% lower odds of receiving parental support for learning compared with those living in the South-Western geographic area. Conversely, children residing in the Northern area had 1.70 times higher odds of receiving parental support for learning compared with those in the South-Western area.

Regarding household wealth status, children from high-wealth households had 1.30 times higher odds of benefiting from parental support for learning compared with those from low-wealth households. However, children from middle-wealth households had 10.86% lower odds of receiving parental support for learning compared with those from low-wealth households.

Parental education level also has a significant influence on parental support for learning among children aged 3 - 4 years, at the 5% significance level. Children whose parents have a higher education level had 10.20% lower odds of receiving parental support for learning compared with those whose parents had no formal education. However, no statistically significant difference was observed between children whose parents had primary education and those whose parents had no

formal education.

4.4.2. Contribution of Household Head-Related Variables

The examination of the contribution of household head-related variables shows that the ethnicity variable is statistically significant in the final model (Table 13). Indeed, the ethnicity of the household head has a significant influence on parental support for learning among children aged 3 - 4 years, at the 5% significance level.

Children belonging to the Peulh/Tuareg/Sonrai ethnic group had 1.25 times higher odds of receiving parental support for learning compared with those from the Bambara/Malinke/Soninke ethnic group. In addition, children from other ethnic groups had 38% lower odds of receiving parental support for learning compared with those from the Bambara/Malinke/Soninke group.

Table 13. Gross and net effects of independent variables related to CM on parental support for the learning of 3 - 4-year-old children in Mali.

Explanatory variable	Gross effects (odds ratio)				Net effect (odds ratio)													
	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17
Sex of head of household																		
Male	Ref					Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Female	1.364 (**)					1.176 (ns)	1.172 (ns)	1.176 (ns)	1.158 (ns)	1.159 (ns)	1.293 (*)	1.299 (*)	1.299 (*)	1.295 (*)	1.307 (*)	1.309 (*)	1.260 (ns)	1.261 (ns)
ethnicity of the head of household																		
Bambara/Malinke/ Sonike	Ref						Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Peulh/Touareg/ Sonrai	1.630 (***)						1.252 (***)	1.250 (***)	1.235 (***)	1.236 (***)	1.234 (***)	1.242 (***)	1.242 (***)	1.244 (***)	1.261 (***)	1.257 (***)	1.251 (***)	1.250 (***)
Senoufo/Minianka/ Bobo/Dogon	0.816 (***)						1.090 (ns)	1.105 (ns)	1.110 (ns)	1.108 (ns)	1.110 (ns)	1.108 (ns)	1.108 (ns)	1.108 (ns)	1.122 (ns)	1.123 (ns)	1.132 (*)	1.129 (ns)
Other	0.608 (***)						0.663 (***)	0.664 (***)	0.656 (***)	0.657 (***)	0.655 (***)	0.640 (***)	0.640 (***)	0.639 (***)	0.633 (***)	0.637 (***)	0.624 (***)	0.624 (***)
Religion of the head of household																		
Moslem	Ref							Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Other religion	0.880 (ns)							0.904 (ns)	0.885 (ns)	0.883 (ns)	0.879 (ns)	0.882 (ns)	0.882 (ns)	0.879 (ns)	0.877 (ns)	0.874 (ns)	0.856 (ns)	0.857 (ns)

Note: ns = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level; Ref = reference category. Source: Authors' analysis based on MICS 2015 data.

4.4.3. Contribution of Mother-Related Variables

The contribution of the net effects of mother-related variables indicates that only the variable level of media exposure remained statistically significant in the final model, at the 5% significance level (Table 14). The results show that children whose mothers are not exposed to media and those whose mothers have low media exposure are respectively 1.45 and 1.25 times more likely to receive parental support for learning compared with children whose mothers have high media exposure. Furthermore, no statistically significant difference was found between

children whose mothers have medium media exposure and those whose mothers have high media exposure.

Table 14. Gross and net effects of mother-related independent variables on parental support for learning among children aged 3 - 4 years in Mali.

Explanatory variable	Gross effects (odds ratio)	Net effect (odds ratio)																
	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17
Mother's age																		
15 - 29 year	Ref									Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
30 - 39 year	1.135 (**)									1.071 (ns)	1.071 (ns)	1.087 (ns)	1.087 (ns)	1.087 (ns)	1.064 (ns)	1.074 (ns)	1.081 (ns)	1.083 (ns)
40 - 49 year	0.895 (ns)									1.044 (ns)	1.045 (ns)	1.113 (ns)	1.113 (ns)	1.111 (ns)	1.099 (ns)	1.104 (ns)	1.120 (ns)	1.123 (ns)
Marital status of the mother																		
Single	0.774 (ns)									0.893 (ns)	0.885 (ns)	0.885 (ns)	0.883 (ns)	0.911 (ns)	0.917 (ns)	0.896 (ns)	0.888 (ns)	
Monogamous marriage	Ref									Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	
Polygamous marriage	0.812 (***)									0.958 (ns)	0.963 (ns)	0.963 (ns)	0.964 (ns)	0.932 (ns)	0.934 (ns)	0.940 (ns)	0.943 (ns)	
Divorced/Separated/ Widowed	0.812 (ns)									0.777 (ns)	0.800 (ns)	0.800 (ns)	0.799 (ns)	0.891 (ns)	0.899 (ns)	0.916 (ns)	0.915 (ns)	
Degree of mother's exposure to the media																		
No exposed	1.468 (***)										1.431 (***)	1.431 (***)	1.432 (***)	1.422 (***)	1.425 (***)	1.447 (***)	1.449 (***)	
Low exposure	1.150 (*)										1.221 (***)	1.221 (***)	1.219 (**)	1.221 (***)	1.223 (***)	1.249 (***)	1.251 (***)	
Medium exposure	0.932 (ns)										1.050 (ns)	1.050 (ns)	1.052 (ns)	1.046 (ns)	1.047 (ns)	1.054 (ns)	1.055 (ns)	
High exposure	Ref										Ref	Ref	Ref	Ref	Ref	Ref	Ref	

Note: ns = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level; Ref = reference category. Source: Authors' analysis based on MICS 2015 data.

4.4.4. Contribution of Child-Related Variables

The contribution of the net effects of child-related variables shows that kinship relationship, birth order, and participation in an early learning programme are statistically significant in the final model. The other variables have non-significant net effects (Table 15).

The kinship relationship with the household head influences parental support for learning among children aged 3 - 4 years, at the 5% significance level. Specifically, children related to the household head are 27% less likely to benefit from parental support for learning compared with children of the household head. Similarly, children who are not related to the household head are 16% less likely to receive parental support for learning compared with children of the household head.

The child's birth order also has an influence on parental support for learning among children aged 3 - 4 years. First-born children are 1.16 times more likely to benefit from parental support for learning compared with children of third birth

order or higher. However, no statistically significant difference was observed between children of second birth order and those of third birth order or higher.

Participation in an early learning or stimulation program represents a key factor associated with parental support for learning among children aged 3 - 4 years. Indeed, children who participate in these programs are 1.49 times more likely to receive learning support compared with those who do not participate.

Table 15. Unadjusted and adjusted effects of child-related independent variables on parental support for learning among children aged 3 - 4 years in Mali.

Explanatory variable	Gross effects (odds ratio)	Net effect (odds ratio)																
	M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17
Child old																		
3 years	Ref												Ref	Ref	Ref	Ref	Ref	Ref
4 year	0.976 (ns)												1.005 (ns)	1.003 (ns)	0.996 (ns)	0.994 (ns)	0.935 (ns)	0.935 (ns)
Sex of child																		
boy	Ref													Ref	Ref	Ref	Ref	Ref
girl	0.911 (*)													0.933 (ns)	0.935 (ns)	0.935 (ns)	0.952 (ns)	0.953 (ns)
Relationship																		
Child of head of household	Ref														Ref	Ref	Ref	Ref
Related to the head of household	0.575 (***)														0.732 (***)	0.730 (***)	0.730 (***)	0.730 (***)
Not related to the head of household	0.779 (***)														0.838 (*)	0.842 (*)	0.842 (*)	0.841 (*)
Birth order																		
Rank 1	1.327 (***)															1.149 (**)	1.161 (**)	1.161 (**)
Rank 2	1.107 (ns)															0.987 (ns)	1.001 (ns)	1.000 (ns)
Rank 3 and beyond	Ref															Ref	Ref	Ref
Participated in an early learning program																		
Yes	1.741 (***)																1.490 (***)	1.486 (***)
No	Ref																Ref	Ref
Child's state of health																		
Yes	0.839 (***)																	0.924 (ns)
No	Ref																	Ret

Note: ns = Not significant; * = Significant at the 10% level; ** = Significant at the 5% level; *** = Significant at the 1% level; Ref = reference category. Source: Authors' analysis based on MICS 2015 data.

4.5. Ranking of Factors Likely to Explain Parental Support for Learning among Children Aged 3 - 4 Years in Mali and Their Mechanisms of Action

The ranking of determinants was based on their contribution to explaining parental support for learning among children aged 3 - 4 years in Mali. The importance

of this ranking lies in its ability to guide decision-making priorities and public interventions, particularly in the design of program and policies aimed at promoting children's learning. Furthermore, it is essential to identify, among the statistically significant factors associated with parental support for learning, those that exert the most decisive influence on this phenomenon. Such an analysis makes it possible to better guide future strategies and actions in favour of child development and learning.

Accordingly, **Table 16** shows that the geographical area is the most influential factor, accounting for 29.59% of the explanation of parental support, followed by the mother's level of media exposure (7.49%) and the ethnicity of the household head (6.62%). The household's wealth index and the kinship relationship with the household head also occupy important positions, with respective contributions of 6.54% and 5.07%. These are followed by participation in an early learning program (2.82%), parents' educational attainment (1.69%), and finally the child's birth order (1.50%).

Table 16. Contributions of explanatory variables to parental support for learning among children aged 3 - 4 years.

Explanatory variables (i)	Chi-square of the saturated model	Chi-square of the model without variable i	Contribution of variable i (%)	Rank
Region	369.64	260.27	29.59	1st
Mother's level of media exposure	369.64	341.97	7.49	2nd
Ethnicity of the household head	369.64	345.17	6.62	3rd
Household wealth index	369.64	345.47	6.54	4th
Kinship relationship	369.64	350.90	5.07	5th
Participation in an early learning programme	369.64	359.23	2.82	6th
Parents' educational attainment	369.46	363.21	1.69	7th
Child's birth order	369.64	364.11	1.50	8th
Total contribution (Ct)				

Source: Authors' analysis based on MICS 2015 data.

5. Discussion

The results of the multivariate analysis highlight several determinants of parental support for learning among children aged 3 - 4 years in Mali. The geographical area appears to be a major determinant. The South-Western regions, which are more urbanized, provide a more favorable environment for parental involvement due to better access to educational infrastructure and basic social services, unlike the Central and Northern regions, which are often affected by insecurity and poverty (UNICEF, 2023: p. 38).

The level of media exposure also emerges as an explanatory factor of parental

support for children's learning. The results show that children whose mothers have low or no exposure to media are more likely to benefit from parental support. These findings are consistent with those of [Young \(1996: p. 7\)](#), who showed that individuals with high levels of media exposure tend to progressively spend less time interacting with those around them, which considerably weakens parent-child relationships. However, other studies have shown that low levels of media exposure can facilitate access to information and strengthen parents' skills in early childhood education ([UNICEF, 2023: p. 57](#)). These findings are consistent with the work of [Kim \(2020: p. 74\)](#), which shows that parents use media to better understand their parental roles and children's needs.

The ethnicity of the household head also appears to be a key factor in parental support for children's learning. Children belonging to the Fulani/Tuareg/Songhai ethnic groups benefit more from parental support for learning. Conversely, the results indicate that children from other ethnic groups are less likely to benefit from such support. These findings are consistent with those of [Balde and Petit \(2012: p. 19\)](#), who show that educational parenting practices among household heads vary according to ethnic affiliation, influenced by social factors. Economic and religious factors. Similarly, [Cissé, Fall, Adjamagbo and Attané \(2018: p. 44\)](#) emphasize that the ethnic affiliation of the household head influences conditions of access to education, particularly in areas where certain ethnic groups have limited resources.

The household wealth index is also an explanatory factor of parental support for learning among children aged 3 - 4 years in Mali. Indeed, wealthier households generally have greater material and educational resources, which contribute to children's cognitive development from an early age. This finding is consistent with the work of [De Blois, Deslandes, Rousseau and Nadeau \(2008: p. 256\)](#), who highlight that households experiencing economic hardship often have limited means to support children's early learning. The same applies to the findings of a study indicating that, in most sub-Saharan African countries, many parents have limited socio-economic resources, which reduces their ability to effectively meet their children's educational needs ([Kambona, 2025: p. 7](#)). Furthermore, households with a higher standard of living tend to be more involved in their children's learning. They engage more frequently in informal exchanges with teaching staff and have greater resources to support their children's educational pathways ([Murray et al., 2015: p. 1048](#)). In addition, the findings of studies by [Chahe and Mwai-kokesya \(2017: p. 7\)](#) and [Bartoli, Joshi, and Wolf \(2022: p. 7\)](#), conducted in Tanzania and Ghana respectively, showed that households with lower living standards generally have limited resources to support their children's early learning. Economic constraints reduce their ability to provide an environment conducive to the development of young children's cognitive and socio-emotional skills.

The kinship relationship between the child and the household head also constitutes a determining factor of parental support for learning among children aged 3 - 4 years. Children who are biologically related to the household head benefit from

greater educational support than children who are fostered or have more distant family ties. These findings are consistent with those of [Fall and Cissé \(2018: p. 116\)](#), who indicate that children are often entrusted to members of the extended family for reasons such as access to schooling, frequently in exchange for domestic work. However, when this transfer occurs under conditions of constraint rather than within a supportive family environment, it may increase children's vulnerability and negatively affect their education.

Participation in an early learning program or preschool class also influences parental support for learning among children aged 3 - 4 years. The results reveal a significant difference between children who participate in an early learning program and those who do not. This finding corroborates the results of [Karla \(2016, p. 278\)](#), who highlights that children with access to structured preschool support benefit from greater parental involvement in their learning, as parents have more opportunities to interact with teachers and discuss various aspects of their children's educational progress. In the same perspective, studies by [Kabore et al. \(2023: p. 451\)](#), conducted in Burkina Faso, and by [Nyakundi, Nyagah, Kalai, and Munayi \(2020: p. 36\)](#), carried out in Nairobi, reveal that children who have benefited from preschool learning programmes achieve better academic outcomes than those who have not. These findings can be explained, in particular, by greater parental involvement in monitoring children's learning, which is encouraged by preschool attendance and regular interactions between families and educational institutions.

Parents' educational attainment ranks seventh in the hierarchy of determinants of parental support for learning. The results show that children whose parents have a higher level of education are less likely to receive direct parental support in their learning activities. This situation could be explained by the fact that highly educated parents often hold more demanding jobs, characterized by heavier workloads and greater professional constraints. Consequently, they have less time to personally support their children's learning, despite their ability to provide other forms of support, such as making educational resources available or creating an environment conducive to learning. This finding is consistent with a study conducted in Ghana, which showed that children whose parents had no formal education were motivated by the desire for their children to benefit from quality preschool education and were involved in their children's learning. As one parent stated: *"I want my child to go to school because not having had the opportunity to attend school myself has been a disadvantage for me"* ([Bartoli et al., 2022: p. 7](#)).

However, this result contrasts with the findings of [Assamoi and Ponde \(2020: p. 17\)](#), who indicate that children with educated parents benefit from their parents' knowledge and experience. Similarly, parents with low levels of education generally tend to be less involved in supporting their children's learning. In contrast, more educated parents are more likely to perceive their children's education as an essential parental responsibility and to engage more actively in the learning process ([Lau et al., 2012: p. 413](#)).

The child's birth order influences parental support for learning among children

aged 3 - 4 years in Mali. In the Malian context, many households must prioritize essential expenditures such as food, clothing, and schooling. Under these conditions, the resources available to support young children's learning may be distributed unevenly according to birth order, with first-born children often receiving greater attention and support than subsequent children.

6. Conclusion

Parental support constitutes an essential factor influencing children's overall development. Many researchers have examined the factors associated with the growth and development of children aged 3 - 4 years. However, studies specifically focusing on parental support for learning among children in this age group remain limited. This topic is far from being fully explored, and further research is needed to identify the factors explaining parental support for learning among children aged 3 - 4 years. The overall objective of this study was therefore to contribute to a better understanding of the explanatory factors of parental support for learning among children aged 3 - 4 years. The study used data from the MICS 2015 survey.

The results show that the child's region of residence is the main explanatory factor of parental support for learning. It is followed by the mother's level of media exposure and the ethnicity of the household head.

The data used for this study present some methodological limitations. Indeed, the absence of information on the occupations of fathers and mothers, as well as on the disability status of parents in the MICS dataset, constitutes a limitation. These variables would have been particularly relevant, as they play a crucial role in family dynamics and educational involvement. Furthermore, parents' disability status may affect their ability to actively participate in their children's education, thereby limiting the support they can provide.

These findings highlight the need to implement targeted policies aimed at reducing geographical, socioeconomic, and cultural disparities by strengthening access to information, early learning program, and educational services, particularly in disadvantaged areas of Central and Northern Mali. They also emphasize the importance of promoting awareness-raising actions adapted to household realities (standard of living, parental education, family structure, and cultural context) in order to strengthen parental involvement in children's learning from early childhood.

Author Contributions

Conceptualization: Ouedraogo Habibou and Sangare Yaya. Methodology: Sangare Yaya. Formal analysis: Sangare Yaya. Data curation: Sangare Yaya. Investigation: Ouedraogo Habibou. Writing—original draft: Ouedraogo Habibou. Writing—review & editing: Ouedraogo Habibou. Validation: Ouedraogo Habibou and Sangare Yaya. Supervision: Ouedraogo Habibou. Project administration: Ouedraogo Habibou and Sangare Yaya. Both authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Assamoi, B. E., & Ponde, A. C. T. (2020). Parental Educational Level, Parental Involvement and Academic Performance among Students in Abidjan. *Revue Ivoirienne d'Anthropologie et de Sociologie*, No. 44. <https://hal.science/hal-05446986v1/document>
- Balde, A., & Petit, V. (2012). Interaction entre stratégies éducatives et scolarisation: L'appartenance ethnique, un marqueur des pratiques éducatives? *Cahiers de la recherche sur l'éducation et les savoirs*, 11, 107-128. <https://doi.org/10.4000/cres.2195>
- Bartoli, B., Joshi, C., & Wolf, S. (2022). Parental Engagement in Ghanaian Pre-Primary Schools: A Mixed-Methods Study. *International Journal of Educational Research*, 112, Article ID: 101926. <https://doi.org/10.1016/j.ijer.2022.101926>
- Bornstein, M. H. (2002). *Handbook of Parenting: Biology and Ecology of Parenting: Volume 2* (p. 458). Lawrence Erlbaum Associates. <https://timothydavidson.com/Library/Books/Bornstein-2002-Handbook%20of%20parenting/Bornstein-2002-Handbook%20of%20Parenting%20Vol.%202.pdf>
- Chahe, J., & Mwaikokesya, M. (2017). The Influence of Parental Support on Child's Learning of Literacy in Tanzania. *Papers in Education and Development*, 35. <https://journals.udsm.ac.tz/index.php/ped/issue/view/273>
- Cissé, R., Fall, A. S., Adjamagbo, A., & Attané, A. (2018). *Parenting in West and Central Africa* (pp. 37-59). <https://hal.science/hal01791432v1/document>
- De Bodman, F., De Chaisemartin, C., Dugravier, B. R., & Gurgand, M. (2017). *Investing in Early Childhood: Equal Opportunities Are Shaped Before Kindergarten* (p. 54). <https://www.solidarites-actives.com/sites/default/files/2019-02/Terra%20Nova%20-%20Rapport%20Investissons%20dans%20la%20petite%20enfance.pdf>
- DeBlois, L., Deslandes, R., Rousseau, M., & Nadeau, J. (2008). L'accompagnement parental dans l'apprentissage en lecture des élèves canadiens. *McGill Journal of Education*, 43, 245-264. <https://doi.org/10.7202/029698ar>
- Fall, A. S., & Cissé, R. (2018). *Child Fostering in Senegal, Ay yaxamrakk la nû la laaj* (p. 219). L'Harmattan.
- Gressens, P. (2021). Le développement du système nerveux: De la neurogenèse à la structuration des réseaux neuronaux. *Bulletin de l'Académie Nationale de Médecine*, 205, 901-907. <https://doi.org/10.1016/j.banm.2021.05.014>
- INSTAT (2015). *Multiple Indicator Cluster Survey (MICS): Final Report* (p. 460). https://www.instat-mali.org/laravel-filemanager/files/shares/eq/ramics15_eq.pdf
- INSTAT (2024). *Rapport d'analyse des données du RGPH5: État et structure de la population*. Bureau Central du Recensement. <https://www.instat-mali.org/laravel-filemanager/files/shares/rgph/rapport-etat-structure-population-rgph5-rgph.pdf>
- Institut National de Santé Publique du Québec (2022). *Child Socio-Emotional Development between 0 and 5 Years and Associated Factors* (p. 71). <https://www.inspq.qc.ca/sites/default/files/publications/2865-developpement-social-tif-enfant-0-5-ans.pdf>
- Janus, M., & Offord, D. R. (2007). Development and Psychometric Properties of the Early Development Instrument (EDI): A Measure of Children's School Readiness. *Canadian*

- Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 39, 1-22. <https://doi.org/10.1037/cjbs2007001>
- Jaramillo, A., & Tietjen, K. (2002). *Développement de la petite enfance en Afrique: Pouvons-nous faire davantage avec moins? Analyse de l'impact et des implications des établissements préscolaires au Cap-Vert et en Guinée. Série des documents de travail sur le développement humain de la Région Afrique, Banque mondiale* (p. 64). <https://documents1.worldbank.org/curated/en/576991468743702228/pdf/226140FRENCH.pdf>
- Kabore, T. C., Koutou, W. F. I., & Yameogo, P. S. (2023). *Analyse de la scolarisation précoce sur les résultats scolaires du cp1 au Burkina Faso* (pp. 443-445). <https://revues.acaref.net/wp-content/uploads/sites/3/2023/03/Tanga-Casimir-KABORE.pdf>
- Kambona, W. (2025). Exploring Parental Involvement in Early Childhood Education in Sub-Saharan Africa: A Systematic Review. *Social Sciences & Humanities Open*, 11, Article ID: 101367. <https://doi.org/10.1016/j.ssaho.2025.101367>
- Karla, Y. W. (2016). *Parental Involvement in the Education of Preschool-Aged Children in Xalapa (Mexico)* (p. 307). Université de Franche-Comté. <https://theses.hal.science/tel-01306690/>
- Kim, R. (2020). *Mothers of Preschool-Aged Children's Experiences of Using the Internet and Social Networks* (p. 204). Université du Québec à Trois-Rivières. <https://depot-e.uqtr.ca/id/eprint/9497/>
- Lau, E. Y. H., Li, H., & Rao, N. (2012). Exploring Parental Involvement in Early Years Education in China: Development and Validation of the Chinese Early Parental Involvement Scale (CEPIS). *International Journal of Early Years Education*, 20, 405-421. <https://doi.org/10.1080/09669760.2012.743099>
- Murray, E., McFarland-Piazza, L., & Harrison, L. J. (2015). Changing Patterns of Parent-Teacher Communication and Parent Involvement from Preschool to School. *Early Child Development and Care*, 185, 1031-1052. <https://doi.org/10.1080/03004430.2014.975223>
- Nsamenang, A. B. (2008). Agency in Early Childhood Learning and Development in Cameroon. *Contemporary Issues in Early Childhood*, 9, 211-223. <https://doi.org/10.2304/ciec.2008.9.3.211>
- Nyakundi, O., Nyagah, G., Kalai, J., & Munayi, S. (2020). Influence of Parental Involvement on Learning Outcomes at Public Early Childhood Centres in Nairobi City County, Kenya. *Journal of Education and Practice*, 4, 26-43. <https://doi.org/10.47941/jep.458>
- UNESCO (2017). *The Evidence Is Clear: Investing in Early Childhood Education and Care Is Essential: Global Status Report* (p. 312). <https://unesdoc.unesco.org/ark:/48223/pf0000248129>
- UNICEF (2016). *UNICEF Annual Report 2015* (p. 60). https://www.unicef.org/media/50051/file/UNICEF_annual_report_2015_FR.pdf
- UNICEF (2017). *Early Moments Matter for Every Child* (p. 92). UNICEF. https://www.unicef.org/media/48891/file/UNICEF_Early_Moments_Matter_for_Every_Child_FR.pdf
- UNICEF (2023). *Situation Analysis of Children in Mali* (p. 75). https://www.unicef.org/mali/media/4816/file/UNICEF%20Mali_Brief_SITAN_Final.pdf.pdf
- World Health Organization (WHO) (2006). *The Child and Adolescent: A Societal Challenge, a Priority for the Health System: Mission Report on Improving Child and Adolescent Health* (p. 950). <https://www.vie-publique.fr/files/rapport/pdf/074000282.pdf>

Yerbanga, L., & Soré, Z. (2025). Participation parentale et difficultés de mise en œuvre de l'Approche Pédagogique Intégratrice dans les écoles primaires de la commune de Ouagadougou. *Lettres, Sciences sociales et humaines*, 41, 131-150.

<https://doi.org/10.64707/revstlsh.v41i2.1895>

Young, K. S. (1996). La dépendance à Internet: L'émergence d'un nouveau trouble clinique. *Cyber Psychology and Behavior*, 1, 237-244.

<https://www.netaddiction.com/articles/newdisorder.pdf>