

## What Explains Differences in Early Child Development Between Urban and Rural Areas in Cameroon?



Jean Claude Saha<sup>1</sup>, Henri Bello Fika<sup>2\*</sup>, Barry Thierno Souleymane<sup>3</sup>, Maxime Tiembou Noumeni<sup>4</sup>

<sup>1</sup>Department of Human Resource Economics, Faculty of Economics and Management, the University of Yaoundé 2, Cameroon

<sup>2</sup>African Center for International, Diplomatic, Economic and Strategic Studies (CEIDES), Yaoundé, Cameroon

<sup>3</sup>The Panafrikan University Institute for Basic Sciences Technology and Innovation (PAUISTI), Nairobi, Kenya

<sup>4</sup>The Institute of Demographic Research and Training (IFORD), Yaoundé, Cameroon

**ABSTRACT:** The objective of this paper is to identify factors that determine the difference in early child development between urban and rural areas of Cameroon. We have used the Fairlie (2005) decomposition method and the data collected as part of the 5th MICS survey conducted in Cameroon in 2014, which provides information for children aged 36 to 59 months. This database indicates that among these children, 68% of those living in urban area enjoy good early child development, against 56.5% of those living in rural area. This difference is significant at 1% threshold. Results of the global decomposition reveal that only 48% of this difference is due to difference in characteristics between the two areas, so can be explained, and 58% is non-explainable and not significant. Results of the detailed decomposition show that five factors contribute to the explanation of this explainable difference: 'Having more than two learning books' contributes to the explanation of 46.29% of it; 'Following an educational program' to the explanation of 43.69%; 'Living in a household whose head comes from the Center, South and East regions of Cameroon' to the explanation of 16.58%; 'Carrying out counting activities, spelling words and / or drawing with a parent or another adult' to the explanation of 10.59% and 'Living in an average living standard household' to the explanation of 7.84%. We suggest government should give children of the two areas the same chance to access these factors.

**KEYWORDS:** Early Childhood Development, Differences, Urban region, Rural region, Fairlie Decomposition Method

### 1. INTRODUCTION

The healthy development of children is decisive for the future prosperity of any society; for every society, the price for neglecting the needs of children is enormous (UNICEF, 2021). Childhood is then another source of prosperity of Nations. Healthy early childhood development can create the conditions for stronger and more inclusive future economic growth, which reduces inequalities and eliminates extreme poverty. This is why the World Bank (2014) is in favor of investing in early childhood. In Washington<sup>1</sup> on April 14, 2016, the President of the World Bank Group, and the Executive Director of UNICEF, called on international and national leaders to strengthen and accelerate measures and investments relating to development programs on Early Childhood Education (ECD), which is essential for equitable development and economic growth. The importance of the development of the young child for the adult that he will be and for the society as a whole justified the creation, in 2015, of an Encyclopedia<sup>2</sup> on the Development of the Young Children, published by the Center of Excellence for Early Childhood Development and the Strategic Knowledge Network on Early Childhood Development.

The economic development cannot be achieved without a well-educated, physically healthy, psychologically balanced and socially well-integrated working population. For well-educated, physically healthy, psychologically balanced and socially well-integrated working population, countries need healthy and well-educated children, thus a good early childhood development.

<sup>1</sup> See Press Release « Le Groupe de la Banque mondiale et l'UNICEF demandent des investissements plus importants en faveur du développement de la petite enfance », Banque Mondiale, Washington, le 14 avril 2016. Consulted 22nd of august 2021, adresse: <https://www.banquemonde.org/fr/news/press-release/2016/04/14/world-bank-group-unicef-urge-greater-investment-in-early-childhood-development>

<sup>2</sup> See *Encyclopédie sur le Développement des Jeunes Enfants*, adresse : <https://www.enfant-encyclopedie.com/>

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Despite the efforts that have been made, African countries are still weak in terms of quality of early childhood development. In addition to the weakness of the quality of early child development at the national level, its spatial disparities within countries' regions are another real concern. There are many disparities among children of the same countries who don't have equal opportunities to develop. One of the most important disparities is the one between urban and rural areas.

As Cameroon is concerned, data from the 5<sup>th</sup> Multiple Indicator Cluster Survey (MICS-5), carried out in 2014 by the National Institute of Statistics (INS), reveals that among children aged 36 to 59 months, 68.0% of those living in urban areas are in a good development process, against 56.5% of those living in the rural area, for an Urban / Rural ratio of 120.4%. In other words, children aged 36 to 59 months living in urban areas are 1.2 times more likely to be in a good development process than those living in rural areas. So in this paper the research question is: what explains this gap between urban and rural areas in terms of early childhood development? This principal research question is composed of two secondary questions: a) what is the contribution of discrimination (unexplainable share of the gap) and that of intrinsic characteristics differences (the explainable component) to the gap? b) Which factors explain the explainable component of the gap between rural and urban areas in terms of early childhood development? To answer these questions, we use the Fairlie (2005) decomposition approach. The paper is organized in 5 sections. After this introduction, we have successively a review of the literature (1), the methodology (2) and the results (3) before the conclusion. The review of the literature reveals that previous work on early childhood development is limited only to researching its determinants, without taking into account the factors of spatial differences in terms of the level of early childhood development. This article aims to fill these gaps, using a decomposition method based on cross-sectional data. Hence the originality of this article. A study aimed at filling these gaps, especially in developed countries such as Cameroon, is therefore highly relevant.

### 2. REVIEW OF THE LITERATURE

Defined by Pikhart *et al.* (2014) as the period from prenatal development to eight years of age, early childhood is known as the most crucial period of lifespan development and the most sensitive to external influences that affect the child's physical and mental capacities. It influences the child's subsequent growth, health and personality throughout the life course (Moore *et al.*, 2015a; Hertzman, 2010; Wafaa, 2017; Sobkin *et al.*, 2016). Indeed, children are social actors shaped by their environment (Caldwell and Bradley, 1984; Goldstein 2012). They develop well in warm and responsive environment that brings them protection and opportunities to explore the world, to play, to learn how to speak and listen to others (Hertzman, 2010). Different groups or areas are not equally warm and responsive for early childhood development. The difference between groups is usually due to discrimination and to differences in group's characteristics. There is discrimination when difference in early childhood development persists even when characteristics are equal in the two groups. This discrimination is inexplicable. Differences in characteristics of the two groups also contribute to the difference in early childhood development. This contribution is the explainable gap. Three types of factors are usually used to explain this explainable difference between groups in terms of early childhood development: socio-economic factors, cultural factors and demographic factors.

#### 2.1. The Role of Socioeconomic Factors

Inequality among families in early childhood environments is a major source of inequality of productive capabilities (cognitive, personality, and biological ones) that promote successful functioning in the society (Conti and Heckman, 2012). In fact, providing intellectual stimulation during the first few years of life has a positive impact on individuals' future development and productivity (Contreras and Gonzalez, 2015). The concept of capability has to do with the set of skills that the child develops under the care and investment of his parents' skills. The role of socioeconomic factors on early childhood development can be analyzed from an economic view, from a sociological view and from a psycho-sociological view.

**From the economic view**, the literature focuses on the child's skills accumulation. One of the seminal contributions is that of Becker and Tomes (1986) who develop a one-period-of-childhood model of transmission of economic status from parents to children. They identify forces that determine intergenerational income mobility, and explain the channels of intergenerational transmission of status. This model assumes that parents maximize their own utility, and are concerned with both their own consumption and the adult utility of their children. The authors also feature parental altruism toward the child under different hypothesis about the ability of parents to borrow against the child's future income, considering capital market conditions. An important implication of the model with perfect credit markets hypothesis is that for a given inherited ability level, the child's level of human capital and labor earnings would be independent of his/her parents' asset and earnings because poor parents can always borrow against their child's earnings to finance investment expenditures. In the case of imperfect capital markets, parental investments in children and consumptions are reduced if borrowing constraints are binding. This reduces the earnings of poor children when they are adults, so their adult incomes are lower for two reasons: lower bequests and lower human capital.

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**From the psycho sociological view**, literature focuses the child's health development. Guhn *et al.* (2016), and Santos *et al.* (2012) show, on Canada data, that children who are born to teen mothers or are in families receiving income assistance, or are involved with child welfare services, are up to four times more likely to be vulnerable than children who are not in any of these subgroups. Pikhart *et al.* (2014) shows that neighborhood deprivation, lower parental income/wealth, educational attainment, and occupational social class, higher parental job strain, parental unemployment, lack of housing tenure and material deprivation of the household, are associated with a wide range of adverse health outcomes. Regarding particularly educational attainment, Contreras and Gonzalez (2015) find that the child's preschool attendance has a more important and positive impact on he's psychomotor development than the mother's employment status. Other studies analyze the role of family's socioeconomic status (SES). Hence Currie and Moretti (2003) analyze identify four channels through which the mother's education influences the health of the child: mothers with more education are less likely to smoke, more likely to be married to a man with a high income, to delay motherhood, and to obtain better prenatal care. Their results demonstrate that each additional year of mother's education reduces the chances of her child being born underweight and premature.

Socioeconomic inequalities among residential communities are associated with inequalities in children's development, but there are important caveats. Children from low SES families living in economically-mixed neighborhoods often develop better than low SES families' children living in poor neighborhoods (Kohen *et al.*, 2002). There is an inverse association between the socioeconomic status of a community and the chances that its residents be exposed to toxic or other hazardous exposures such as wastes, air pollutants, poor water quality, excessive noise, residential crowding or poor housing quality (Evans and Katrowitz, 2002). Access to high quality services often varies according to community SES: learning and recreation, child care, medical, transportation, food markets and opportunities for employment (Dunn *et al.*, 2000, DiPietro, 2000). The circumstances in which children are born determine their exposure to environments that promote or compromise their healthy development. Children's health, development and well-being can be compromised by a number of direct adverse experiences during the prenatal and postnatal periods: sustained poverty, recurrent abuse and neglect, parental alcohol or drug abuse, homelessness, and family violence (Moore *et al.*, 2015b, Kawachi and Berkman, 2003; Pearson *et al.*, 2013, Wandersman and Nation, 1998; Surkan *et al.*, 2006; Powers *et al.*, 2013; Eastwood *et al.*, 2014 Vyncke *et al.*, 2013; Leadbeater *et al.*, 1996 ; Christensena *et al.*, 2014 ; Franchetti, Y. & H. Ide, 2014).

**From the psycho sociological view**, literature focuses on the child's personality building. Based on Almlund *et al.*(2011) and Borghans *et al.*(2008), Deckers *et al.* (2015)<sup>3</sup> find that SES is a powerful predictor of many facets of a child's personality such as time preferences, risk preferences, altruism as well as crystallized and fluid IQ. This result confirms that of Fewell *et al.* (1998), Delaney and Doyle (2012) and Bauer *et al.* (2014) who show that children from families with higher SES are more patient, tend to be more altruistic and less likely to be risk seeking, and score higher on IQ tests. Consequently SES is a prime factor for shaping child's personality.

Furthermore, to control the genetic transmission effect on the relation between family's SES and child's IQ, Deckers *et al.*'s (2015) split IQ into two components, crystallized IQ and fluid IQ. The fluid IQ is supposed to be more hereditary than the crystallized IQ<sup>4</sup>. They find a larger parental influence on crystallized IQ as opposed to fluid IQ. Hart and Risley (1995) and Contreras and Gonzalez (2015) show that the child's IQ is also influenced by the family structure (does the child live with a single parent, the age of the mother at birth, and the current number of siblings at home), the number of hours per week during which the mother is the main caregiver of the child, the kind of activities parents actually perform with their child when they spend time together and the richness of the domestic language environment. This positive association between family's SES and child's IQ is also found in Ribe *et al.* (2018) who demonstrate that poverty is associated with a slower cognitive development of children, confirming the results of Hart and Risley (1995), Rubenstein *et al.* (1982), Carew (1980) and Golden and Anderson (1979).

### 2.2. The Role of Cultural Factors

Considering culture as defined by Cole *et al.* (2010)<sup>5</sup>, Hofstede (1980) and Stephens (2007), Hertzman (2010) found on the case of

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<sup>3</sup> Their data on family environment cover different aspects of parental behavior such as parenting style, time parents spend with their children, quality of time spent together, differences in family structure, initial conditions at birth and the personality of the mother. The inclusion of the quality of time spent with the child is legitimated by the evidence from Wearne and Hiebert (1988) and Mason and Allen (1986) who showed that parents reading books and stories to their toddlers and preschoolers determine their children's later reading ability and school success.

<sup>4</sup> Many authors did this before: Rindermann *et al.* (2010), Anger and Heineck (2010), Turkheimer *et al.* (2003), Capron and Duyme (1989).

<sup>5</sup> For Cole *et al.* (2010), "culture consists of the historically accumulated knowledge, tools and attitudes that pervade the child's proximal ecology, including the cultural 'practices' of nuclear family members and other kin. These enculturated members of society

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India, a link between it and child development. More precisely, he found that women's bargaining power in the society influences positively opportunities for successful early childhood development. This result is confirmed later by Pikhart et al. (2014) and Ribe et al. (2018).

### 2.3. The Role of Demographic Factors

On the case of Chile, Contreras and Gonzalez (2015) found that demographic variables (child's age, child's sex, child's weight at birth, number of siblings in the household) are important factors in a child's biopsychosocial development and even have a greater impact than health variables. Other works had previously revealed that demographic variables act as intermediaries in the relationship between sociocultural and cultural factors on the one, and the child's development on the other hand. In this direction, Bauer et al. (2014) found that the effect of cultural values on personality building is significant for older (primary school) children, but not for younger (kindergarten); Pikhart et al. (2014) found a positive relationship between the families' SES and the child's health which increases with the child age. These results are consistent with Conti and Heckman (2012) who found that the risk of disease increases with age, especially in disadvantaged populations.

This important literature can be summarized as follow: a) Family members provide most stimuli for children and control children's contact with the wider environment; b) The most salient features of the family are its social and economic resources; c) Social resources include parenting skills and education, cultural practices and approaches, intra-familial relations and health status of family members; d) Economic resources include wealth, occupational status and dwelling conditions; e) The influence of family's SES is mediated by access to societal resources that enable families to make choices and decisions in the best interest of their children, including services such as parenting and caregiver support, quality childcare, primary health care and education; f) Each generation of children inherits biological and cultural endowments from their parents. In figures 1 and 2 below, we attempt a schematic representation of this literature.

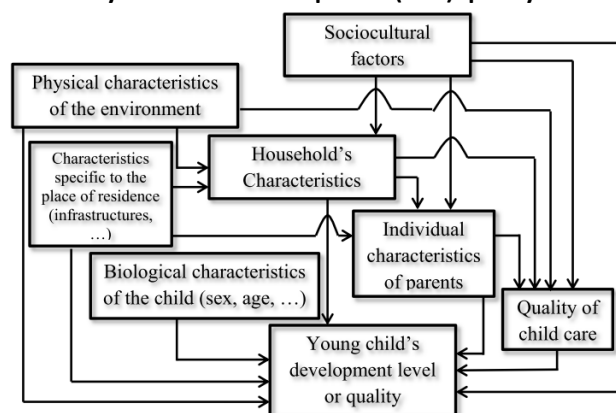
Figure 1 below highlights factors at the macro, meso and micro societal levels that influence the quality of early childhood development.

At the macro societal level, we have the socio-cultural environment in which the child lives and which contains the habits, customs and beliefs of the populations of the child's living environment. These factors concerned, either directly on the quality of the child's development, or ineffective, by acting on factors at the meso-societal level such as the characteristics of the household (standard of living, size, composition, etc.) and of the parents of the child (marital status, matrimonial regime, level of education, socio-professional category, etc.). The factors mentioned above influence the quality of development of the young child *via* the quality of the supervision reserved for him (level of attention, diet, medication, type of education, etc.). This quality of supervision is at the micro-societal level.

Similarly, the physical environment, which straddles the macro and meso-societal levels, and which contains factors such as climatic conditions, air quality, soil type, biosphere, basic infrastructure, both directly and indirectly on the quality of child development.

Alongside the characteristics mentioned above, there are innate biological characteristics of the child (sex, age, etc.) which occur at the micro-societal level and which also affect their development level.

**Figure 1. Conceptual framework for the early childhood development (ECD) quality.**



**Source:** The authors, based on the literature

are themselves subject to a variety of forces in both the natural ecology and society as they carry out their roles, such as care giving and earning a living". Culture might be seen as a set of ideas that define the beliefs and behaviors of individuals and groups in a society, which exist in both visible and invisible forms (Hofstede, 1980; Stephens, 2007).

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Figure 2 below, for its part, highlights the relationships between socio-economic, cultural, demographic and biological factors and the major dimensions of young child development: level of health and personality.

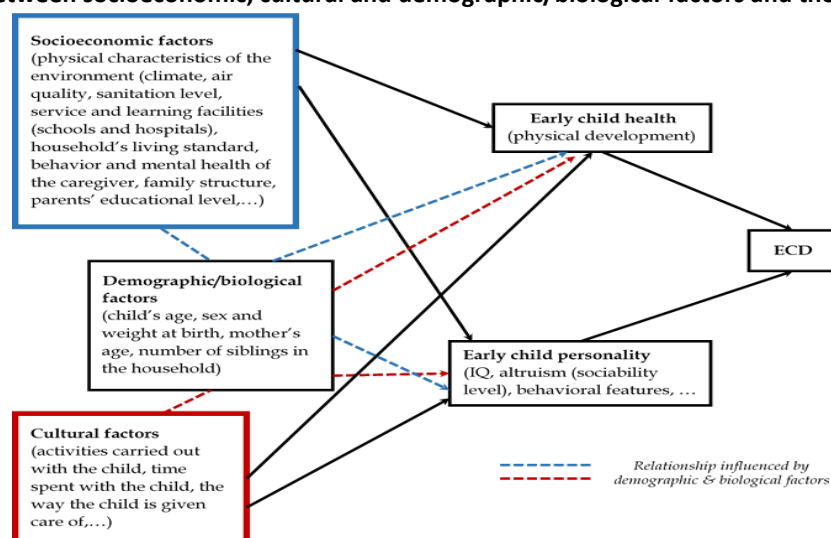
The level of health makes it possible to apprehend the quality of physical development of the young child, while the personality is a dimension which includes his intelligence quotient, his level of altruism (or level of sociability), his behavior, among others.

Among the socio-economic factors that have an influence on the two dimensions mentioned above, we can mention the climate, the air quality, the level of sanitation, the level and quality of access to basic infrastructures (schools, hospital structures, roads, pharmacies, ...), the standard of living of the household, the behavior and mental health of the caregiver, the structure of the family and the level of education of the parents.

Among the cultural factors, we can cite the activities carried out with the child, time spent with the child and the way the child is given care of.

The influence of those factors on the two above-enumerated dimensions is impacted by demographic and biological factors (child's age, sex and weight at birth, mother's age, number of siblings in the household, ...).

**Figure 2. Relationship between socioeconomic, cultural and demographic/biological factors and the ECD quality.**



**Source:** The authors, based on the literature

There is an important theoretical and empirical literature on factors determining the quality of the development of the young child; but the gap of probabilities of good early childhood development between two groups of children in Sub-Saharan Africa is still to be investigated. This paper attempts to fill this gap, with application on Cameroun, following the methodology below.

### 3. THE METHODOLOGY

In this section, we present the variables, we specify the source of data and we discuss the method.

#### 3.1. The Variables

##### 3.1.1. The Dependent Variable (Y)

The dependent variable is the differential, between urban and rural areas, of probability for a child to be in a good development process. We consider children aged 36 to 59 months. Y is therefore a continuous quantitative variable obtained from a dichotomous variable Y which takes two values, 1 if the child is in a good development process, and Y = 0 otherwise.

The proportion of children who are in a good development process is referred to as the "young child's development index" (YCDI). This index is constructed on the basis of four dimensions and ten criteria that follow:

**Dimension 1: Reading and calculation.** This dimension includes the following three criteria:

- the ability to identify / name at least ten letters of the alphabet. It takes the value 1 if the answer is positive and 0 otherwise;
- the ability to read at least four simple and common words. It takes the value 1 if the answer is positive and 0 otherwise;
- the ability to know the name and recognize the symbols of all the numbers from 1 to 10. It takes the value 1 if the answer is positive and 0 otherwise.

If at least two of these three criteria are positive, then the child is considered to be on the right track of development in the

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field of literacy and the corresponding composite variable is given the value 1. If not, the value is 0.

**Dimension 2: Physical health.** This dimension consists of the following two criteria:

- the child's ability to grab a small object, such as a stick or a pebble, from the ground with two fingers;
- the child is sometimes not too sick to play.

If any of these criteria are true, then the child is considered to be on the right track for physical development, and the corresponding composite variable is given the value 1; otherwise, the value is 0.

**Dimension 3: Socio-emotional framework.** This dimension consists of the following three criteria:

- the child gets along well with other children. It takes the value 1 if the answer is positive and 0 otherwise;
- the child does not kick, bite or strike other children. It takes the value 1 if the answer is positive and 0 otherwise;
- the child is not easily distracted. It takes the value 1 if the answer is positive and 0 otherwise.

If at least two of these criteria are met, then the child is considered to be on the right track of socio-emotional development and the corresponding variable is given the value 1, otherwise, the value is 0.

**Dimension 4: Ability to learn.** This dimension consists of the following two criteria:

- the child follows simple instructions to do something correctly. This variable takes the value 1 if the answer is positive and 0 otherwise;
- the child's ability to independently do what he or she is asked to do. This variable takes the value 1 if the answer is positive and 0 otherwise.

If one of these criteria is met, then the child is considered to be on the right path of development and the corresponding composite variable is given the value 1, and if otherwise, the value is 0.

If the child is in a good track in at least 3 of the 4 dimensions, he is considered to be globally in a good development process. Finally, the dependent variable Y is the proportion of children who are in a good development process, it is referred to as the "young child's development index" (YCDI).  $Y=YCDI$ . Y is a probability, it has different values in rural and in urban areas.

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

### 3.1.2. The Independent Variables

We have nine independent variables, namely:

- **The residence area.** As noted in the literature, the residence area is both physical (ecological aspects, infrastructures) and relational (made up of a community who, through the transmission of cultural values, shapes the educational and caregiving behaviors of the child's caregivers). Environment characteristics have an influence on the child's biophysical and socioeconomic development. For example, children who receive a good education from their caregivers are more respectful than those who do not. Also, a child who lives in bad climatic conditions and sanitation with a poor access to service facilities is more likely to present poor health indicators than those living in a better residence area;
- **The religion of the Head of household.** This variable permits to take into consideration the impact of cultural factors on early childhood development;
- **The educational level of the mother.** On the basis of the literature, we state that the more a mother is educated, the better does she take care of her children;
- **The sex of the child.** Contreras and Gonzalez (2015) show that girls perform better than boys in biophysical and cognitive tests;
- **The standard of living of the household.** The higher is the family's socioeconomic status, the better are the child's healthcare, nutrition, preschool quality and toys.
- **The age group to which the child belongs.** This demographic variable permits to control for age effect on the early childhood development. As the child grows, his/her speed of reasoning raises. It is also demonstrated that, because of biological modifications, older children are physically more resistant to germs than younger ones.
- **The child's diet.** The diet has an impact both on the development of the child's brain (his IQ), but also on his physical growth process and on his health status. Children who benefit from a good diet are more likely to be on a good physico-cognitive develop than those who do not;
- **The quality of the social relationships existing between the child and his social environment.** This refers to a set of variables relating to the educational and fun activities carried out with the accompaniment of a parent or other adults, such as readings, walks, tales, songs, drawings and other educational games. These variables are supposed to influence the child's cognitive and psychosocial development through the transmission of the ability to speak, the

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development of creativity and visual memory, sociability and mental health. Also, a child who benefits from a warm and emotional environment is more likely to be open minded and less hostile than a the one who lives in a violent environment;

- **The existence of an educational program.** Children who follow an educational program are more likely to develop good psychomotor and cognitive capacities than those who do not.

The table 1 below presents the different modalities of the above-mentioned independent variables and the sign of the awaited coefficients.

**Table 1. The different modalities of the independent variables and the expected sign of the coefficients in the model.**

Variables	Modalities	Values	Expected sign of the contribution to the explanation of the Urban-Rural Gap in terms of ECD	
Number of books	No book	1	-	
	One book	2	+	
	two books	3	++	
	More than two books	4	+++	
Possession of a toy	Yes	1	+	
	No	2	-	
Following an educational program	Yes	1	+	
	No	2	-	
Reading with parents or other adult	Yes	1	+	
	No	2	-	
Stories told to child by parent or other adult	Yes	1	+	
	No	2	-	
Singing with parent or other adult	Yes	1	+	
	No	2	-	
Going on a walk with parent or other adult	Yes	1	+	
	No	2	-	
Playing with parent or other adult	Yes	1	+	
	No	2	-	
Counting, Spelling and/or Drawing with parent or other adult	Yes	1	+	
	No	2	-	
Child's Sex	Male	1	+/-	
	Female	2	+/-	
	Not educated	1	-	
Educational level of the child's mother	Primary	2	+	
	Secondary	3	++	
	Higer Education	4	+++	
Religion of the household's head	Christian	1	+++	
	Muslim	2	++	
	Other religion	3	+/-	
	Animiste/No religion	4	-	
Home Area of the household's head	Soudano-Sahelian Area	1	-	
	South Area	West/Littoral	2	++
	West/North Area	West	3	++

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Variables	Modalities	Values	Expected sign of the contribution to the explanation of the Urban-Rural Gap in terms of ECD
Living Standard of the household	East/Center/South Area	4	+++
	Stranger	5	+ /-
	Low	1	-
Quality of nutrition	Medium	2	++
	Hight	3	+++
	Very bad	1	--
Child's age (in months)	Bad	2	-
	Good	3	++
	36 - 47 months	1	+ /-
	48 - 59 months	2	+/-

- a. (-) = weak negative effect; (--) = strong negative effect; (+) = weak positive effect; (++) = strong positive effect; (+++) = very strong positive effect; (+/-) = positive or negative effect.
- b. Source: The authors (through the use of the MICS 5 data, Cameroon).

### 3.2. The Data

The data are constructed from the database of the 5th Multiple Indicator Cluster Survey (MICS-5) survey carried out by the Cameroon's National Institute of Statistics (INS) in 2014. This survey had a sample of 10,213 households with 2,815 children aged between 36 and 59 months (1,385 male and 1,430 female). It should be noted that the MICS-5 is the more recent multiple indicators clusters survey. The data is relatively old, but not enough to significantly affect the accuracy of the research results.

### 3.3. The Method

For the analysis, we use the Fairlie's (2005)<sup>6</sup> method. To achieve our first objective, this method permits decompose the differential between the two groups, of the dependent variable, into two effects: a) the endowment effect, that is the effect of the difference in intrinsic characteristics between the two groups, called the explained difference; b) the discrimination effect, that is the effect of the difference in coefficients between the two groups, called unexplained component.

Let's consider:

$\delta = Y_U - Y_R$  (1)  
 $Y_U$  is the average probability of being in a good development process in the urban area and  $Y_R$  the one in the rural area. We'll have:

$$Y_U = \sum_{j=1}^{N_U} \frac{F(X'_{Uj}\beta_U)}{N_U} \quad (2) \quad \text{and} \quad Y_R = \sum_{j=1}^{N_R} \frac{F(X'_{Rj}\beta_R)}{N_R} \quad (3)$$

where  $F(X'_j\beta) = \frac{e^{\sum_{i=1}^k x_{ij}\beta_i}}{1 + e^{\sum_{i=1}^k x_{ij}\beta_i}} \quad (4)$

$F$  denotes the logistic function of cumulative distribution and  $N_k$  the number of individuals in the sample  $k$ .  $X$  denotes the vector of the characteristics (dichotomized variables or modalities) and  $\beta$  the vector of the corresponding coefficients. By replacing  $Y_U$  and  $Y_R$  with their respective expressions (2) and (3) in equation (1), we have the following:

$$\delta = \left[ \sum_{j=1}^{N_U} \frac{F(X'_{Uj}\beta_U)}{N_U} - \sum_{j=1}^{N_R} \frac{F(X'_{Rj}\beta_R)}{N_R} \right] \quad (5)$$

<sup>6</sup> This model is an extension of Blinder-Oaxaca's (1973) decomposition method, which is used to study the differential values of a variable between two groups of individuals. In the case of our study, these two groups are young children from urban area and those from rural area. Originally used by Blinder (1973) and Oaxaca (1973) to explain wage differentials between men and women, this model was later extended to non-linear models such as logit, probit and tobit to explain the differentials of average probabilities of occurrence of a given event between two groups.



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Equation (5) can also be written as follow:

$$\delta = \underbrace{\left[ \sum_{j=1}^{N_U} \frac{F(X'_{Uj}\beta_U)}{N_U} - \sum_{j=1}^{N_R} \frac{F(X'_{Rj}\beta_U)}{N_R} \right]}_{(a)} + \underbrace{\left[ \sum_{j=1}^{N_R} \frac{F(X'_{Rj}\beta_U)}{N_R} - \sum_{j=1}^{N_R} \frac{F(X'_{Rj}\beta_R)}{N_R} \right]}_{(b)} \quad (6)$$

The term (a) is the part of the difference of probability due to the differences in characteristics between urban and rural children. The term (b) is the unexplained component, the gap that persists when the distribution of characteristics is identical in the two groups (this means even when (a) = 0).  $b \neq 0$  is due to the existence of discrimination between urban and rural areas.

To achieve our second objective, the same method<sup>7</sup> permits us to estimate the contribution of each characteristic (each variable and each modality of a variable) to this endowment effect (E). Let for example  $x_i^E$  be the *i*th variable (or modality of a variable) in the model and  $\beta_i^E$  its contribution to E. If  $\beta_i^E$  is negative, it means that  $x_i^E$  contributes to the reduction of differential. In other words, if the probability of having characteristic  $x_i$  were identical for the individuals of the two groups, then the gap would be reduced, all other things being equal. If  $\beta_i^E$  is positive, we'll say  $x_i^E$  contributes to increase the observed difference.

### 4. RESULTS AND DISCUSSION

This empirical section consists of both descriptive and explanatory analyses results

#### 4.1. Descriptive Analysis Results

Detailed results of the descriptive analysis (Table 2 below) show two main tendencies that will be tested in more profound analysis. The first is that, in both urban and rural areas, the Early Child Development is statistically associated with:

- recreational activities (particularly possession of a toy and stories told to child by parent or other adults);
- educational activities (number of books, following an educational program, reading with parents or other adults);
- the living standard of the household; and
- the child's age.

The second is that there is no significant difference between urban and rural areas in terms of probability of being in a good development process, among children who:

- have at least two learning books at their disposal;
- live in households headed by foreign individuals or originated from the Center, South or East regions of Cameroon;
- live in households with standard of living at least equal to the average;
- benefit from very low nutritional quality.

**Table 2. Summary of descriptive statistics**

Variables	Residence Area				Urban/Rural Parity Index	
	Urban		Rural			
	Frequencies of the sub groups	Percent age of children being in a good development process	Frequencies of the sub groups	Percent age of children being in a good development process		
<b>Number of books</b>	No book	877	62.9%	1435	57.6%	109.2%***

<sup>7</sup> It is important to note that the results of Fairlie's (2005) decomposition method are sensitive to the order of inclusion (or arrangement) of the explanatory variables. This problem occurs only in the nonlinear case because, contrary to the linear case, the assumption of additivity of the various contributions is not checked. To overcome this problem, we proceed in randomization which is an iterative process.

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Variables	Residence Area				Urban/Rural Parity Index	
	Urban		Rural			
	Frequencies of the sub groups	Percent age of children being in a good development process	Frequencies of the sub groups	Percent age of children being in a good development process		
					104.4% [ns]	
	One book	76	68.4%	29	65.5%	]
	two books	110	80.9%	41	68.3%	118.5%*
						108.7%
	More than two books	210	88.1%	37	81.1%	[ns]
	<i>Khi-square p-value</i>	<i>0.000</i>		<i>0.015</i>		-
Possession of a toy	Yes	1080	70.3%	1060	61.6%	114.1%***
	No	193	61.7%	482	52.1%	118.4%***
	<i>Khi-square p-value</i>	<i>0.017</i>		<i>0.000</i>		-
Following an educational program	Yes	584	79.8%	290	72.8%	109.7%***
	No	689	59.8%	1252	55.4%	108.0%**
	<i>Khi-square p-value</i>	<i>0.000</i>		<i>0.000</i>		-
Reading with parents or other adult	Yes	342	80.4%	184	75.0%	107.2%*
	No	931	64.8%	1358	56.4%	114.8%***
	<i>Khi-square p-value</i>	<i>0.000</i>		<i>0.000</i>		-
Stories told to child by parent or other adult	Yes	577	74.4%	685	62.9%	118.2%***
	No	696	64.5%	857	55.2%	116.9%***
	<i>Khi-square p-value</i>	<i>0.000</i>		<i>0.002</i>		-
Singing with parent or other adult	Yes	763	71.2%	960	59.9%	118.8%***
	No	510	65.7%	582	56.5%	116.2%***
	<i>Khi-square p-value</i>	<i>0.038</i>		<i>0.193</i>		-
Going on a walk with parent or other adult	Yes	764	69.4%	1020	59.8%	116.0%***
	No	509	68.4%	522	56.3%	121.4%***
	<i>Khi-square p-value</i>	<i>0.705</i>		<i>0.189</i>		-
Playing with parent or other adult	Yes	976	69.1%	1231	60.1%	114.9%***
	No	297	68.7%	311	52.7%	130.3%***
	<i>Khi-square p-value</i>	<i>0.904</i>		<i>0.018</i>		-
Counting, Spelling and/or Drawing with parent or other adult	Yes	488	76.8%	439	61.7%	124.5%***
	No	785	64.1%	1103	57.4%	111.7%***
	<i>Khi-square p-value</i>	<i>0.000</i>		<i>0.118</i>		-
Child's Sex	Male	616	65.3%	769	57.0%	114.6%***
	Female	657	72.5%	773	60.3%	120.2%***
	<i>Khi-square p-value</i>	<i>0.006</i>		<i>0.185</i>		-
Educational level of the child's mother	Not educated	194	67.0%	610	60.0%	111.7%**
	Primary	430	64.0%	664	56.5%	113.2%***
	Secondary	566	71.0%	263	60.1%	118.2%***
	Higer Education	83	85.5%	5	100.0%	85.5%***
	<i>Khi-square p-value</i>	<i>0.001</i>		<i>0.139</i>		-
Religion of the household's head	Christian	794	69.8%	909	58.1%	120.1%***
	Muslim	309	66.3%	395	60.8%	109.2%*

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Variables	Residence Area				Urban/Rural Parity Index	
	Urban		Rural			
	Frequencies of the sub groups	Percent age of children being in a good development process	Frequencies of the sub groups	Percent age of children being in a good development process		
Home Area of the household's head	Other religion	100	73.0%	92	60.9%	119.9%**
	Animiste/No religion	70	65.7%	146	54.8%	119.9%*
	<i>Khi-square p-value</i>	0.505		0.588		-
	Soudano-Sahelian Area	351	68.1%	689	61.8%	110.1%***
	South West/Littoral Area	341	70.1%	371	57.7%	121.5%***
	West/North West Area	504	70.6%	282	51.1%	138.3%***
	East/Center/South Area	54	57.4%	151	62.9%	91.2% [ns]
	Stranger	23	56.5%	49	51.0%	110.8% [ns]
	<i>Khi-square p-value</i>	0.198		0.017		-
	Living Standard of the household	Low	118	69.5%	1066	58.4%
Medium		260	55.8%	373	56.0%	99.5% [ns]
Hight		895	72.7%	103	69.9%	104.1% [ns]
<i>Khi-square p-value</i>		0.000		0.040		-
Quality of nutrition	Very bad	19	57.9%	77	62.3%	92.9% [ns]
	Bad	171	73.1%	263	57.0%	128.2%***
	Good	1083	68.5%	1202	58.7%	116.6%***
	<i>Khi-square p-value</i>	0.278		0.698		-
Child's age (in months)	36 - 47 months	660	60.9%	806	53.0%	115.0%***
	48 - 59 months	613	77.7%	736	64.8%	119.8%***
	<i>Khi-square p-value</i>	0.000		0.000		-
<b>OVERALL</b>		<b>1273</b>	<b>69.0%</b>	<b>1542</b>	<b>58.6%</b>	<b>117.6%**</b> *

- c. (\*\*\*) : the gap is statistically significant at the 1% threshold;  
 (\*\*): the gap is statistically significant at the 5% threshold;  
 (\*): the gap is statistically significant at the 10% threshold;  
 [ns]: the gap is not statistically significant at the 10% threshold.
- d. Source: The authors (through the use of the MICS 5 data, Cameroun).

### 4.2. Fairlie Decomposition Results

The Fairlie decomposition results are statistically reliable with regard to the robustness of the binary logistic models estimated in urban and rural areas (Table 3).

**Table 3. Results of robustness tests of basic logit models**

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Robustness Criteria	Logit Model for Urban Area	Logit Model for Rural Area	
Adequacy (Pseudo R <sup>2</sup> )	0.1043	0.0529	
Overall significance (P value)	0.0000	0.0000	
Adjustment	Explanatory power (rate of good predictions)	71.5600%	61.87%
	Discriminatory quality (LROC)	0.7168	0.6472

e. **Source:** The authors (through the use of the MICS 5 data, Cameroon).

Concerning the global decomposition, results (Table 3) show that only the characteristics' effect is significant at 10% threshold, and explains 48% of the difference due to characteristics between the two groups. There is no significant discrimination between the two groups.

**Table 3. Overall results of the Fairlie decomposition method**

<i>Number of observations in the urban area</i>	<i>1273</i>		
<i>Number of observations in the rural area</i>	<i>1542</i>		
<b>Total number of observations</b>	<b>2815</b>		
	Coef.	Std. Err.	P-value
<b>Urban Area</b>	0.6897	0.0130	0.000
<b>Rural Area</b>	0.5863	0.0126	0.000
<b>Gap</b>	0.1035	0.0181	0.000
<b>Explained gap</b>	0.0500 (48.33%)	0.0289	0.084
<b>Unexplained gap</b>	0.0535 (51.67%)	0.0339	0.114

f. **Source:** The authors (through the use of the MICS 5 data, Cameroon).

Concerning the detailed decomposition, results (Table 4) show that five characteristics (or modalities of variables) have a significant positive effect on this intrinsic characteristics' effect.

**Table 4. Detailed results of the Fairlie decomposition method (explaining the explained gap of early childhood development index)**

Variables	Modalities	Contribution to the gap due to characteristics effects	Percentage
<b>Child's Sex</b>	Male	0.0010062 [ns]	2.01
<b>Child's Age</b>	48 - 59 months	0.0005078 [ns]	1.02
<b>Number of books</b>	One book	-0.0000774 [ns]	-0.15
	two books	0.0039677 [ns]	7.94
	More than two books	0.0231434***	46.29
<b>Possession of toys</b>	No	-0.0005775 [ns]	-1.16
<b>Educational program</b>	Yes	0.0218453***	43.69
<b>Reading with parent(s) or other adult</b>	Yes	0.0046732 [ns]	9.35
<b>Story told by parent(s) or other adult</b>	Yes	0.0004532 [ns]	0.91
<b>Singing with parent(s) or other adult</b>	No	0.0000692 [ns]	0.14

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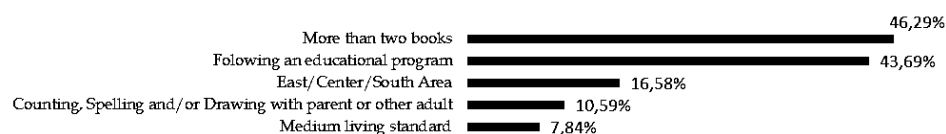
Variables	Modalities	Contribution to the gap due to characteristics	Percentage
Goes on walks with parent(s) or other adult	No	0.0016024 [ns]	3.20
Playing with parent(s) or other adult	No	0.0006315 [ns]	1.26
Counting, spelling and/or drawing with	Yes	0.0052974*	10.59
Educational level of the child's mother	Not educated	-0.0062582 [ns]	-12.52
	Secondary	0.0004892 [ns]	0.98
	Muslim	0.0002547 [ns]	0.51
Religion of the household's head	Other religion	0.0000817 [ns]	0.16
	Animiste/No religion	0.0009044 [ns]	1.81
Home Area of the household's head	South	-0.0014981 [ns]	-3.00
	West/Littoral	-0.0058656 [ns]	-11.73
	West/North West	-0.0058656 [ns]	-11.73
	East/Center/South	0.0082895**	16.58
Living Standard of the household	Stranger	0.0013641 [ns]	2.73
	Medium	0.0039194*	7.84
Quality of nutrition	Hight	-0.013475 [ns]	-26.95
	Very bad	0.0016286 [ns]	3.26
	Bad	-0.0023774 [ns]	-4.75
<b>Total</b>		<b>0.0499997*</b>	<b>100.00</b>

- g. (\*\*\*) : the gap is statistically significant at the 1% threshold;  
 (\*\*): the gap is statistically significant at the 5% threshold;  
 (\*): the gap is statistically significant at the 10% threshold;  
 [ns]: the gap is not statistically significant at the 10% threshold.

h. Source: The authors (through the use of the MICS 5 data, Cameroon).

The five significant characteristics and their contribution to the explanation of the endowment effect are presented on the figure 3 below:

**Figure 3. Contribution of the statistically significant variables (or modalities of variables) to the gap due to intrinsic characteristics effect.**



**Source:** Results of the authors (on the basis of the MICS 5 data, Cameroon).

As this figure indicates:

a) Having more than two learning books contributes to the explanation of 46.29% of the explained component of the Urban/Rural gap. In other words, giving children in both urban and rural areas the same chance of having more than two books would contribute to the reduction of 46.29% of the explained gap between urban and rural areas in terms of ECD. So, considering that the endowment effect represents 48% of the total difference, we conclude that giving children in both urban and rural areas the same chance of having more than two books contributes to the reduction of 22.22% of the total gap.

b) Following an educational program contributes to the explanation of 43.69% of the explained component of the gap. This means that, giving children in both urban and rural areas the same chance to have access to an educational program would contribute to the reduction of 43.69% of the explained gap, and of 20,97% of the total gap between urban and rural areas in terms of ECD.

c) Living in a household whose head comes from the Center, South and East regions of Cameroon contributes to the explanation

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of 16.58% of the explained component of the gap. This is an interesting result when we consider politics. Indeed, these three regions are ethnically related to the head of states and the regime that governs Cameroon since 1982.

d) Carry out counting activities, spelling words and / or drawing with a parent or another adult contributes to the explanation of 10.59% of the explained gap. In other words, giving children in both urban and rural areas the same chance of spending quality moments with a parent or another adult would contribute to the reduction of 10.59% of the explained component of gap, and of 5.08% of the total gap between urban and rural areas in terms of ECD.

e) Living in an average living standard household contributes to the explanation of 7.84% of the explained gap. This means giving children in both urban and rural areas the same chance of living in an average living standard household would contribute to the reduction of 3.76% of the total gap between urban and rural areas in terms of ECD.

We can notice that the difference between urban and rural areas is more accentuated within the subset of children who possess more than two books and less accentuated in the subset of children who live in households with average standard of living. It can also be noted that the difference observed between urban and rural areas in terms of early children development is mainly explained by variables which influence the cognitive development of the child.

## 5. CONCLUSION

The aim of this paper was to identify factors that explain the gap, between urban and rural areas of Cameroun, in the quality of the early child's development. To achieve this goal, we used the decomposition method of Fairlie (2005) on the data collected as part of the 5th MICS survey conducted in Cameroon in 2014 for the children aged 36 to 59 months. Results of the global decomposition show that only the characteristics' effect is significant and explains 48% of the difference, and the discrimination effect is not significant. This means that only 48% of the difference can be explained. In order to find factors which explain this share of the difference, we have carried out the detailed decomposition. Results of this detailed decomposition show that five factors contribute to the explanation of this explainable difference: Having more than two learning books contributes to the explanation 46.29% of this and 22.22% of the total difference; Following an educational program contributes to the explanation of 43.69% of the explained component of the gap and of 20.97% of the total gap; Living in a household whose head comes from the Center, South and East regions of Cameroon contributes to the explanation of 16.58% of the explained gap and of 7.96% of the total gap; Carry out counting activities, spelling words and / or drawing with a parent or another adult contributes to the explanation of 10.59% of the explained gap and 5.08% of the total gap; Living in an average living standard household contributes to the explanation of 7.84% of the explained gap 3.76% of the total gap. Three of these factors have to do with education, one has to do with the origin of the household's head, and one with the living standard of the household. Thus, if policy makers want to reduce the gap between urban and rural areas in early childhood development index, we suggest that they should specially try to facilitate, for both urban and rural areas, access to child's improving cognitive capabilities facilities.

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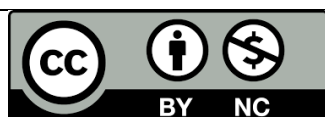
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