SOCIOECONOMIC STATUS AND ITS ASSOCIATION WITH CHILDHOOD DEVELOPMENT AMONG CHILDREN 3 AND 4 YEARS OF AGE IN SIERRA LEONE

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ABSTRACT

Background: Early childhood development is a public health priority and strongly influences children's basic learning, school success, health and later life trajectory in adulthood. Although some risk factors related to early childhood development are documented, further exploration is necessary considering socioeconomic status. The present study was conducted to determine the association between socioeconomic status and early childhood development among children in Sierra Leone.

Objective: The objective of this study was to assess whether there is a relationship between socioeconomic status and early childhood development among children 3 and 4 years of age in Sierra Leone.

Data and Method: This study extrapolates data from the sixth round of the Multiple Indicator Cluster Survey for Sierra Leone from the United Nations Children's Fund (UNICEF). Participants for this study were 4736 children, aged 3 and 4 years and their mothers / caregivers. Bivariate (chi square test) and logistic regression data analyses were performed in order to determine the association between socioeconomic status and its effect on childhood development.

Results and Discussion: The study found evidence that household wealth is a strong predictor of early childhood development in the unadjusted model and even after controlling for age, sex and area in the adjusted model. Although the potential effect of maternal education on early childhood development in this study is very small, household wealth is found to be very important predictor of early childhood development.

Conclusion: For children to achieve their full developmental potential globally, early childhood development is crucial. This study provides new evidence of sharp differences in the various early childhood domains by socioeconomic status. The results suggest that improving SES should be the main goal of health literacy promotion if children were to reach their full developmental potential.

ABBREVIATIONS

DHS	Demographic Health Survey
ECD	Early Childhood Development
ECCD	Early Childhood Care and Development
ECE	Early Childhood Education
ECCE	Early Childhood Care and Education
ECDI	Early Childhood Development Index
EU	European Union
LBW	Low Birth Weight
LMIC	Low- and Middle-Income Countries
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
SDG	Sustainable Development Goals
SES	Socioeconomic Status
SPSS	Statistical Package for Social Sciences
Stats SL	Statistics Sierra Leone
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

Children are one of the vulnerable groups in every community around the world. At the same time, the global world future depends on a healthy and striving child population for its prospering. This acknowledgement is increasingly reflected in the global development and health agenda. The Millennium Development Goals adopted in 2000 prioritized children in Goal 4 (to reduce child mortality) and the current Sustainable Development Goals (SDGs) include children in Goal 3 (good health and well-being) under target 3.2 and in Goal 4 (quality education) under target 4.1 and 4.2 (United Nations, 2000; United Nations, 2015). Target 4.2 calls on countries to "ensure that, by 2030, all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education" (United Nations, 2015). By including Early Childhood Development (ECD) as a target under Goal 4, "inclusive and quality education for all", the global community has recognized ECD as a central component of global and national development (United Nations, 2015).

ECD is an integrated concept that cuts across various sectors - including health and nutrition, education, and social protection - and refers to the physical, cognitive, linguistic, and socio-emotional development of young children. This definition includes children up to eight years old on the premise that a successful transition to primary school depends not only on the child's school readiness, but also on the readiness of schools to adapt to the specific needs of young learners in the early grades. ECD is also known as early childhood care and development (ECCD) and encompasses early childhood education (ECE), early childhood care and education (ECCE), and other designations (Naudeau, Martinez, Premand, & Filmer, 2011). For this study, ECD will be assessed by using four domains and these are; the physical, socioemotional, cognitive and literacy-numeracy domains.

Over the past several decades, there are wealth of literatures that have highlighted the vital role of ECD for success later in life (J. J. Heckman, 2006; Moffitt et al., 2011; Nores & Barnett, 2010; Peet et al., 2015). The first three years of life is considered a very crucial time in a child's life because it is during these early years children are set to acquire the most basic and yet transformative developmental skills (Black et al., 2017; Shonkoff et al., 2012). As a result, early childhood has gained immense attention in the eyes of both governmental and non-governmental

organizations as a point of breakthrough for improving the developmental outcomes of individual children as well as the social and economic wellbeing of the whole society (Black et al., 2017). This increased focus is also reflected in the recently ratified SDGs, which directly incorporate early development under Targets 3.2, 4.1 & 4.2 (United Nations, 2015). Early Childhood Development is critical and very important in life trajectory to achieve sustainable development by getting the best out of mankind at preliminary stage of early childhood development in life and ultimately, for becoming economically successful and productive adults (J. Heckman, Pinto, & Savelyev, 2013; J. J. Heckman, 2007; Hoddinott, Maluccio, Behrman, Flores, & Martorell, 2008). A growing literature establishes that early childhood environments substantially impact later life outcomes (e.g., Knudsen et al. 2006, Heckman 2008, and Almond and Currie 2011).

Adverse consequences for child development

ECD is the bedrock for sustainable development by enabling everyone with all the basic needs and support to reach their full human potential (Loizillon, Petrowski, Britto, & Cappa, 2017; Richter et al., 2017). A break in the chain of proper early childhood development may lead to debilitating consequences not only to the child during childhood such as poorer schooling outcomes (Currie, 2009), childhood stunting (Miller, Murray, Thomson, & Arbour, 2016) but span through adulthood resulting in higher risks of ill health during adult life (Currie, 2009), lower adult educational attainment (Feinstein, 2003) and may even transfer from one generation to the other (Grahn-Farley, 2011). A better understanding of the association of socioeconomic conditions and early childhood development might help in contributing to mitigate the debilitating consequences not only in childhood but might also help in smooth transition in life course.

Sociodemographic profile of Sierra Leone

Sierra Leone is a country in West Africa and Freetown is its capital city. The country is bordered by Guinea to the north-east, Liberia to the south-east, and the Atlantic Ocean to the south-west. The country has a tropical climate, with a diverse environment ranging from savannah to rainforests. The total land area is 71,740 km (27,699 sq. miles) and with a population of 7,092,113 (based on the 2015 Census). Sierra Leone is made up of four administrative regions: Northern Region, Eastern Region, Southern Region and the Western Area, which are subdivided into 14 districts. There are sixteen ethnic groups living in Sierra Leone, each with its own unique language and customs. The two largest and most influential are the Mende and Temne people. The Temne

are predominantly found in the north of the country, while the Mende are predominant in the southeast. It is a Muslim majority country, with the overall Muslim population at 78 per cent of the population, though there is an influential Christian minority at about 21 per cent. Sierra Leone is regarded as one of the most religiously tolerant nations in the world where Muslims and Christians live and work side-by-side in peace. (Statistics Sierra Leone, 2017). See appendix for the map of Sierra Leone.

Justification of the study

Despite numerous studies on early childhood development across the globe, such studies cannot represent the Sierra Leone perspective due to the uniqueness of every country in terms of cultural upbringing among others. Studies from Sierra Leone show gaps in childhood development early in the life cycle. Little is known about this important question in Sierra Leone. This study will therefore document new evidence of sharp differences in the various early childhood domains by socioeconomic status among children 3 and 4 years of age in Sierra Leone using the United Nations Children's Fund (UNICEF) Multiple Indicator Cluster Survey (MICS) data and hence contribute a Sierra Leonean perspective.

Significance of the study

The result of this study will be beneficial to researchers by gaining better understanding of the impact socioeconomic status in early childhood development. This will serve as a stepping-stone for other researchers on the same. For policy makers, it will be resourceful in helping them make informed decisions that will help children reach their full potential for the general good of all. In the case of health professionals, a better understanding about the history of a child will help them with appropriate diagnosis and hence better prognosis. For academia, especially those in the teaching field, it will help in identifying children who need special attention and by so doing no one will be left behind in the academic pursue of knowledge among others.

The general research objective of this study is to assess whether there is a relationship between socioeconomic status and early childhood development among children 3 and 4 years of age in Sierra Leone.

CHAPTER TWO

THEORETICAL FRAMEWORK

The present study is guided by an ecological perspective proposed by Bronfenbrenner. Bronfenbrenner's ecological model (Figure 1) is holistic in nature as it captures various factors regarding human development with more emphasis on the role of the ecological environment. (Bronfenbrenner, 1979). The model is applicable in diverse areas of child health and well-being (Earls & Carlson, 2001). In previous studies, the model has provided a framework for understanding and addressing the broader context of social issues affecting children like bullying (Hong, Lee, Lee, Lee, & Garbarino, 2014), peer victimization among young persons (Hong & Eamon, 2009) and safe schools (Hong & Eamon, 2012). It has also found application in setting a broader context for understanding several areas of the physical health of children like childhood obesity (J. E. Williams, 2011) and risky sexual behaviours (Voisin, DiClemente, Salazar, Crosby, & Yarber, 2006) among others.

Bronfenbrenner's ecological systems theory explains how a child grows and develops is being influenced by the child's interaction with the environment. This theory looks at a child's development within the context of the system of relationships that form the child's environment. Conflict or changes in any of the ecological system will have ripple effect throughout the other ecological systems. According to the model, the different levels of the environment that influence children's development include; the microsystem, the mesosystem, the exosystem, the macrosystem and the chronosystem. To study a child's development, we should not only look at the child and the child's immediate environment but also at the interaction between the various systems as they are all interconnected (Bronfenbrenner, 1977).

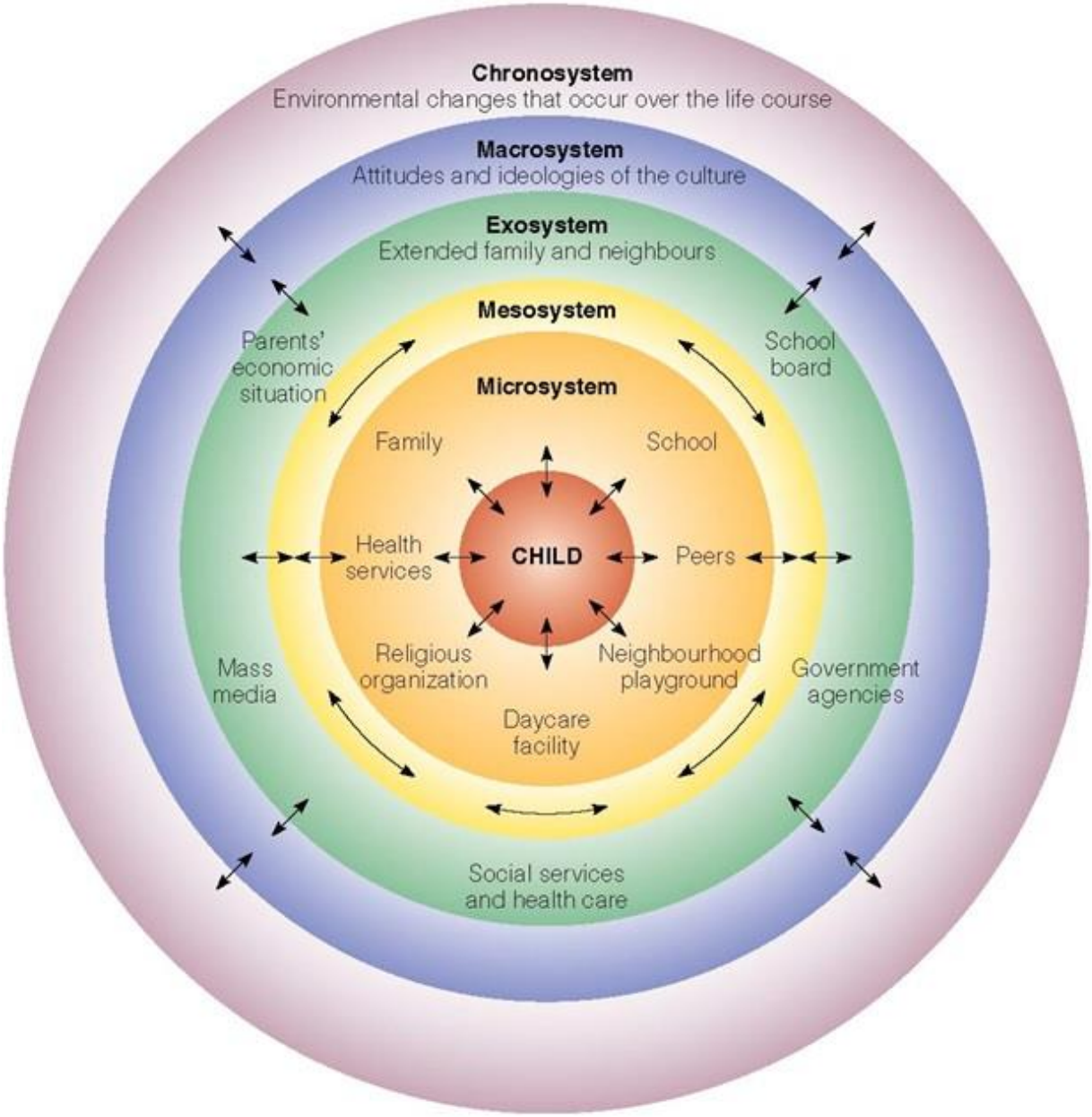

Figure 1. Bronfenbrenner's ecological theory of development

Source: Retrieved from https://images.app.goo.gl/gVWQvr5aAmDRECPk9 on 20/04/20

MICROSYSTEM

The microsystem is the closest system to the child and contains the structures with which the child has direct contact. It refers to the small and immediate environment in which the child lives. This system encompasses the relationships and interactions a child has with her immediate surroundings (Berk, 2000). The structures include and not limited to home, school or daycare, caregivers and organizations they interact with. How these various groups or organizations tend to interact with the child will have a profound effect on how the child grows. The more friendly, encouraging and nurturing the relationships and places are, the better the child will be able to grow. On the flip side, how a child acts or reacts to people in his immediate environment will determine how he will be treated in return. (Bronfenbrenner, 1977). According to Bronfenbrenner's (1992) revised definition of the different levels in his ecological systems theory, the microsystem can also be defined as "a pattern of activities, roles, and interpersonal relations experienced by the developing person in a given face-to-face setting with particular physical and material features and containing other persons with distinctive characteristics of temperament, personality, and systems of belief"(p. 148). In the microsystem, relationships have impact in two directions - both toward the child away and from the child. For instance, a child's parents may affect her beliefs and behaviour; however, the child also affects the behaviour and beliefs of the parent. Bronfenbrenner calls these bi-directional influences, and he shows how they occur among all levels of environment. The interaction of structures within and between systems is key to this ecological model. At the microsystem level, bi-directional influences are strongest and have the greatest impact on the child. However, interactions from the other systems can also have an impact on the child (Bronfenbrenner, 1977).

MESOSYSTEM

The mesosystem refers to a system of microsystems. The mesosystem provides the connection between the structures of the child's microsystem (Berk, 2000). It can be understood as how the different parts of the child's microsystem work together at a point in a child's life. It encompasses the interactions among child caregivers, family and school. For instance, if the father takes an active role in his child's school by attending parent-teacher meetings and watching his child's basketball games, this will help in the child's overall growth. On the other hand, if the child is being raised by dad with step-mom and mom with step-dad and there are disagreements of how to raise the child, the conflicting lessons from the parents may have a negative effect on the child's growth in different ways. (Bronfenbrenner, 1977). Since the mesosystem is a system of microsystems, Bronfenbrenner (1979) argues, that such interconnections "can be as decisive for development as events taking place within a given setting" (p. 3).

EXOSYSTEM

The exosystem is an extension of the mesosystem (Bronfenbrenner, 1977). It involves the linkage and processes taking place between two or more settings, at least one of which does not involve the developing person, but in which events occur that influence processes within the immediate setting that does contain that person (Bronfenbrenner 1992, p. 148). In other words, the exosystem is the larger social system in which the child does not function directly (Berk, 2000). It includes other people and places that the child may not interact with very often but still have a large effect on the child. Some examples include extended family members, parents' workplaces, the mass media, agencies of government, communication and transportation facilities, and neighborhood. (Bronfenbrenner, 1977). For instance, if a child's parent receives a promotion at work, this may have a positive effect on the child as the parents will be in a better position to support the child with his needs; but on the other hand, if the parent is laid off from work, that may have negative effects on the child if the parents are unable to pay rent, buy food and meet the basic needs of the child (Bronfenbrenner 1992, p. 148).

MACROSYSTEM

Of all the systems in the ecological model, the macrosystem is the largest and most remote set of people and things to a child but still has a great influence over the child (Bronfenbrenner, 1977). The macrosystem may be considered the outermost system in the child's environment (Berk, 2000). It refers to the overarching institutional patterns of the culture or subculture, such as the educational, political, social, economic, and legal systems, of which micro-, meso-, and exo-systems are the concrete manifestations. The macrosystem determines how a child and his or her caregivers are treated and interact with each other as they navigate in the different types of settings. These factors can affect a child either positively or negatively. (Bronfenbrenner, 1977). The macrosystem have a cascading influence throughout the interaction of all the other systems. For instance, if it is the belief of the culture that parents should be solely responsible for raising their children, that culture is less likely to provide resources to help parents. This, in turn, affects the structures in which the parents' function. The parents' ability or inability to carry out that responsibility toward their child within the context of the child's microsystem is likewise affected. (Berk, 2000).

CHRONOSYSTEM

The chronosystem involves the various environmental events and transitions over the life course, as well as social and historical circumstances (Bronfenbrenner, 1977). In another words, it encompasses the dimension of time as it relates to a child's environments. Elements within this system can be either external, such as the timing of a parent's death, or internal, such as the physiological changes that occur with the aging of a child. As children get older, they may react differently to environmental changes and may be more able to determine more how that change will influence them. (Berk, 2000).

According to Bronfenbrenner (2001), human development, over life course takes place through processes that are progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its immediate and external environment. In order to have an influence or effect, the social interaction must occur on a regular basis over extended periods of time. (Bronfenbrenner, 2001)

Bronfenbrenner's ecological systems theory focuses on the quality and context of the child's environment. He states that as a child develops, the interaction within these environments becomes more complex. (Bronfenbrenner, 2001). In a nutshell, Bronfenbrenner's ecological systems theory encompasses the child and its environment from microsystem to chronosystem level and provides a vivid understanding how the social interaction at all these levels might influence a child's development.

The present study considered early childhood development as the outcome of interactions among factors within the micro-, meso- and exosystems in the Bronfenbrenner's ecological model. This theoretical framework is applicable to this study because interaction between factors at different levels are treated with equal importance and hence provides a more comprehensive understanding of how environmental factors influence early childhood development.

CHAPTER THREE

LITERATURE REVIEW

There had been literatures that had well documented positive associations between socioeconomic status and various aspects of early childhood development. Bradley and Corwyn in their literature review of socioeconomic status and child development concluded that better socioeconomic status in the form of higher income and parental education especially maternal education was associated with a wide range of child development outcomes including socioemotional development and improved cognitive achievement (Bradley & Corwyn, 2002).

Also, in a study done by Paxson and Schady involving more than 3000 predominantly poor preschool aged children in Ecuador found that higher household wealth and higher levels of parental education were associated with higher scores on a measure of early cognitive development (Paxson & Schady, 2007). In a similar study done by Schady based on a longitudinal cohort of 2118 children in Ecuador reiterated the fact that, maternal level of schooling and mother's vocabulary were strong predictors of the cognitive development of young children (Schady, 2011).

The association between socioeconomic status and cognitive development in early childhood

McCoy et al. (2017) used pooled ECDI data collected in 35 low- and middle-income countries between 2005 and 2015 to estimate the number of preschool-age children with low cognitive and/or socio-emotional scores. They estimated that 80.8 million children ages 3 and 4 years in LMICs countries fail to meet some basic milestones in their cognitive or socioemotional development.in 2010, with the largest number of affected children in sub-Saharan Africa (29.4 million; 43.8% of children ages 3 and 4 y), followed by South Asia (27.7 million; 37.7%) and the East Asia and Pacific region (15.1 million; 25.9%). In addition, the authors found positive associations between low scores in these two domains and stunting, poverty, being a boy, rural residence and lack of stimulation by caregivers.

Genetic, cerebral, perceptual, emotional, and behavioral mechanisms include cognitive growth (Boivin, Kakooza, Warf, Davidson, & Grigorenko, 2015; Sastre-Riba, 2006). Neuropsychological realms can be influenced during cognitive development by nutritional, infectious, and toxic causes,

children's upbringing (Harmony, 2004), and their parents' socioeconomic status (SES) (Brito & Noble, 2014; Ghosh, Chowdhury, Chandra, & Ghosh, 2015).

SES is a complicated system that takes into accounts not only family income and parental education/occupation, but also mental and physical wellbeing, family climate, housing conditions, and characteristics of the community (Hackman, Farah, & Meaney, 2010). In particular, in executive function assessments, parental education and parental occupation were found to be responsible for more than 14 percent of the variance in the children's scores (Noble, Norman, & Farah, 2005). A higher level of parental schooling, superior living conditions, greater cognitive stimulation at home, and enhanced cognitive output in children have been correlated with a larger family income (Clara Mazzoni, Stelzer, Alejandro Cervigni, & Martino, 2014; Crookston, Forste, McClellan, Georgiadis, & Heaton, 2014; Hamadani et al., 2014).

A low SES is known to have a negative influence on the growth of children and is considered to be a significant language and executive function predictor (Hackman & Farah, 2009; Noble et al., 2005) (Hackman & Farah, 2009; Noble et al., 2005). Noble et al. (2005) indicated that SES influence on executive function during infancy is mediated by the relationship of parents with their children and their ability to reduce stress. In another study, kids who lived in better physical conditions and whose mothers had a higher level of education received greater executive function scores (Filippetti, 2011).

A retrospective analysis of children aged 4 months, 1 and 7 years showed that substantial neurological defects occurred in lower-SES children at a younger age, implying a lasting effect of prenatal conditions (Chin-Lun Hung et al., 2015). A longitudinal analysis of the relationship between SES and the growth of memory and language in children less than 2 years of age showed no differences between SES groups at 9 and 15 months of age, but reported a lower output at 21 months in children from families with a low level of education (Noble, Engelhardt, et al., 2015). In a study of older medium- and low-SES children in two separate age groups (8 - 9 vs. 10 - 12 years), main effects of age, SES, and their interaction with language, attention, and memory were found (Arán Filippetti, 2012); however, main effects of age and SES but not their interaction were identified for executive function (working memory, flexibility, inhibition, and planning) in comparisons between age and SES. Taken together, these results suggest that in certain

neuropsychological domains (e.g. language, memory, attention) but not in executive function, older children with lower SES perform worse.

In countries with less educational and social progress (Crookston et al., 2014; Lawson et al., 2017), where exposure to abuse or violence and malnutrition may be more likely, a low SES may have a greater effect on the neuropsychological development of children (Peterman, Neijhoft, Cook, & Palermo, 2017). The effect of low SES on neurocognitive function is linked, among others, to decreased linguistic stimulation and increased stress experience, and this negative impact may be greater in developing countries compared to developed ones (Sripada, Swain, Evans, Welsh, & Liberzon, 2014; Ursache & Noble, 2016). Previous studies have often restricted the impact of SES and age in children to specific domains rather than doing a complete neuropsychological examination, and most have examined one or two age groups alone. Therefore, it has not been determined whether the influence of SES is the same at all childhood ages, or whether it has unique effects at various ages on certain neuropsychological domains. Neurodevelopment in low-SES children has been indicated to be slower and this distinction with medium-/high-SES children is widened during neurodevelopment (Brito & Noble, 2014; Grieve, Korgaonkar, Clark, & Williams, 2011). In particular, authors have identified a worse output in memory , attention, and language at older ages among low-SES children (Arán-Filippetti, 2013; Arán Filippetti, 2012; Hackman, Gallop, Evans, & Farah, 2015), due to their longer exposure to the unfavorable conditions of a low SES (Hackman et al., 2010). Previous research has demonstrated that SES has a positive correlation with parent - child connectedness (Clark & Ladd, 2000). The undesirable relationship may deprive children of advantageous psychological circumstances that benefit their cognitive development. By contrast, parents in high SES families have much more time, energy and knowledge about education, and they are inclined to express more warmth and affection in order to cultivate a favorable parent–child relationship (Dixson, Keltner, Worrell, & Mello, 2018; Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012).

The association between socioeconomic status and Literacy-numeracy in early childhood

Socioeconomic status represents the social and economic status of family members and is evaluated by them. In general, people agree that a clear and stable link exists between SES and the academic achievement and cognitive growth of children. The results from research, however, are contradictory (Bradley & Corwyn, 2002; Lareau, 2011). Many studies have found that factors of family context can explain much of the variation in the academic achievement of students and play a more significant role than schools (Berkowitz, Moore, Astor, & Benbenishty, 2017; Lawson & Farah, 2017; Reardon, 2011). From childhood to adolescence, the positive association between SES and academic achievement continues and is consistent across races (Aikens & Barbarin, 2008; Caro, 2009; Ren & Xin, 2013). However, some studies have shown that for academic achievement, SES has little or no significance (Rech & Stevens, 1996; Ripple & Luthar, 2000; Seyfried, 1998). In contrast, a meta-analysis conducted by White (1982) of almost 200 studies found a positive correlation between SES and academic achievement. Another meta-analysis conducted by Sirin (2005) of more than 70 studies published between 1990 and 2000 showed that the association between SES and academic achievement was not strong. Both meta-analyses, however, found that this relationship steadily declined over time (Sirin, 2005; White, 1982).

Several studies had explored the relationship between SES and reading ability in both Chinese and Western cultural backgrounds. The importance of SES in children's reading ability in the Chinese cultural context has been highlighted in several studies (Chow, Ho, Wong, Waye, & Zheng, 2017; Pan et al., 2017; Su et al., 2017; Wen, Liang, & Liu, 2016; Zhang et al., 2013). For instance, Zhang et al. (2013) explored the relations among SES, vocabulary, and reading with 262 children who had diverse SES backgrounds and were followed from ages 4 to 9 in Beijing, China. They found that SES contributed to variance in phonological skills and vocabulary in the early developmental stages. A longitudinal study conducted by Su et al. (2017) investigated the predictive power of early family factors for children's reading literacy at the end of primary school with 262 Chinese children. The results indicated that family SES and parent-child reading engagement were associated with literacy skills. Also, Wen et al. (2016) examined the influence mechanism of family SES on student reading ability in China based on a questionnaire and a reading test completed by 574 eighth grade students from two medium-sized counties. These results also verified the influence of family SES on children's reading ability. Several longitudinal studies have shown that the lower the SES of children is, the poorer their academic performance is, and

this association is consistent across children's ages (Pungello, Kupersmidt, Burchinal, & Patterson, 1996; Walker, Greenwood, Hart, & Carta, 1994). SES of the family plays a crucial role in children's reading ability development and many studies had made discoveries regarding the relationship between a child's reading ability and the SES of the family (Jeynes, 2003; Noble, Houston, et al., 2015; Rowe & Goldin-Meadow, 2009).

The association between socioeconomic status and physical development in early childhood

In a study done by Grantham-McGregor et al. in developing countries estimated that more than 200 million children do not reach their full developmental potential in the first 5 years. Children living in these developing countries are exposed to multiple risk factors including poverty, malnutrition, poor health, and non-stimulating home environments, which negatively affect their language–cognitive, social–emotional, and physical development.(Grantham-McGregor et al., 2007). Also, in a national representative study involving 1459 children aged 36-59 months in Viet Nam, protective and risk factors for being developmentally on track were identified using the ECDI. The risk factors associated with being off track on the overall developmental trajectory included low level of maternal education, family ethnicity, lack of preschool attendance, inadequate learning support, physical punishment, not being breastfed and stunting. Results show that the girls were less likely than boys to be physically developmentally on track (Duc, 2016).

Similarly, in a nationally representative sample involving 1332 children aged 3-6-year-old from 150 communities in Madagascar who were followed up since when they were age 0-3 years old in order to examine socioeconomic gradients and child development. As expected, children with educated mothers had better scores in physical development and other domains (Fernald, Weber, Galasso, & Ratsifandrihamanana, 2011).

The association between socioeconomic status and socioemotional development in early childhood

The socio-emotional competence of young children is an significant precursor to effective school and academic transition (McClelland, Acock, & Morrison, 2006; Morrison, Ponitz, & McClelland, 2010) and to establish and sustain positive relationships with peers and teachers (La Paro & Pianta, 2000). Subsequent well-being, such as social adaptation and psychopathology, has also been linked with early socio-emotional maturity (Henricsson & Rydell, 2006) and criminal conduct and adult unemployment (Nores, Belfield, Barnett, & Schweinhart, 2005). With the growing focus on the significance of early socio-emotional development for school readiness, school performance, and later social adjustment (Ackerman & Barnett, 2005; Blair, 2002) and recognizing the socio-economic status that can predict the socio-emotional competence of children is important.

Early childhood socio-emotional changes are mainly affected by the sense of the family (Johnson, Martin, Brooks-Gunn, & Petrill, 2008; Mashburn, Hamre, Downer, & Pianta, 2006). By actively and regularly engaging in interactions with parents, children develop social skills (Dunham, Dunham, Tran, & Akhtar, 1991) and the home atmosphere is where children learn how to respond to social signals and how to behave in social circumstances (Pachter, Auinger, Palmer, & Weitzman, 2006). Parental relationship status or family structure has a profound effect on a wide variety of home environments, including socioeconomic and parental resources that have a direct impact on the early socio-emotional growth of children (Cavanagh & Huston, 2008; Hampden-Thompson, 2012; Wu, Hou, & Schimmele, 2008). Studies have repeatedly reported that the breakup of parents' relationships that is, divorce or separation (Amato, 2010; Amato & Keith, 1991) or relationship dysfunction that is, single parenthood or cohabitation (Brown, 2004) have adverse effects on home environmental resources associated with socio-emotional development in children.

In early childhood, the influence of family structure on the socio-emotional development of children is particularly significant. Children experiencing conflict and breakdown of parental relationships in early childhood are less likely to establish a safe bond with the primary caregiver (Clarke-Stewart, Vandell, McCartney, Owen, & Booth, 2000). Often, early childhood is when children expect parents to provide the most intensive care and support. Thus, in the home setting, young children can be more susceptible to parental distress and disturbances (Phillips & Shonkoff, 2000). When parents themselves are struggling with emotional stress, this can be reflected in

children also feeling more stress (K. Williams & Dunne-Bryant, 2006). Social change do continue to influence the impact of family structure on young children (Amato & Sobolewski, 2001). To be precise, Cavanagh and Huston (2008) found that at the end of elementary school, social change was primarily affected by the enduring impact of early childhood family instability, rather than by middle childhood family instability. The early experience of children in family life can have a strong effect on their growth, and family structure can be one of the profound risk factors for the socio-emotional development of children.

In a study done by Fink et al involving 99,222 children age 3 to 4 years in 35 low- and middle-income countries showed that 54.3 percent of children in Sierra Leone had low cognitive and / or socioemotional ECDI score as well as 39.6 percent had low socioemotional ECDI score. Sierra Leone had the second highest low cognitive and / or socioemotional ECDI score after Chad 67 percent and third in terms of low socioemotional ECDI score 39.6 percent behind Cameroon 45.0 percent and Central Africa Republic 39.8 percent (Fink et al., 2013).

RESEARCH OBJECTIVES AND HYPOTHESES

Specific Objectives

- To assess the relationship between household socioeconomic status and cognitive development among children 3 and 4 years of age
- To assess the relationship between household socioeconomic status and literacy – numeracy development among children 3 and 4 years of age
- To assess the relationship between household socioeconomic status and physical development among children 3 and 4 years of age
- To assess the relationship between household socioeconomic status and socioemotional development among children 3 and 4 years of age

Hypotheses

Hypothesis I: Socioeconomic status is positively associated with cognitive development among children 3 and 4 years of age

Hypothesis II: Socioeconomic status is positively associated with literacy - numeracy development among children 3 and 4 years of age

Hypothesis III: Socioeconomic status is positively associated with physical development among children 3 and 4 years of age

Hypothesis IV: Socioeconomic status is positively associated with socioemotional development among children 3 and 4 years of age

CHAPTER FOUR

METHODOLOGY

Data and method

Epistemological foundation

Epistemology is about how we produce knowledge and what scientific knowledge looks like once produced (Neuman, 2014, p. 95). The epistemological foundation of this study is based on post-positivism. Positivists pursue scientific knowledge inductively by gathering and organizing empirical evidence and then generalizing it, hence attempting to make that knowledge a perfect mirror or accurate representation of the world through empirical tests of hypotheses. Positivists tend to test causal hypotheses by analyzing the data through quantitative research techniques such as and not limited to regression analysis (Sousa, 2010, p. 467).

Post-positivism is broadly defined as approaches to knowledge growth rejected by positivism and it is a critique of both the ontological and epistemological foundations of theories of knowledge. Post-positivism is a range of perspectives that have in common a rejection of the positivist claims to be able to discern a single social reality (Fox, 2008). Post-positivism assumes an intersubjective world where reality is a social construction and the aim of research is to uncover the meaning of this reality as understood by an individual or a group. For this to be achieved, requires full involvement of the researcher with the research subjects. Post-positivist approaches include more numerous critical examinations of a problem. Since the truth is never entirely understood, the emphasis of the post-positivist view is on falsifying, rather than verifying, hypotheses. (Mills, Durepos, & Wiebe, 2010).

Research Design

The research design for this study is a non-experimental correlational design and the aim is to assess whether there is an association between household socioeconomic status and early childhood development among young children in Sierra Leone.

Dataset

This study extrapolates data from the sixth round of the MICS for Sierra Leone from UNICEF. The survey was carried out by Statistics Sierra Leone (Stats SL) with technical support from UNICEF as part of the Global MICS Programme, with financial support provided by the Government of Sierra Leone, UNICEF, United Nations Population Fund (UNFPA), the World Health Organization (WHO), World Food Programme (WFP) and the European Union (EU). Field work lasted from May to August, 2017 and the results of the Sierra Leone MICS 2017 were released in August 2018. The results of the Sierra Leone MICS 2017 are available on the websites of Statistics Sierra Leone and MICS UNICEF. The sixth round of the MICS for Sierra Leone in 2017 included 11,774 children, under five years of age, of whom 11,764 children were interviewed yielding a response rate of 99.9 percent (MICS UNICEF, 2018). This newly available data collected by UNICEF's Multiple Indicator Cluster Survey is population representative. For this study a total of 4736 children aged 3 and 4 years were used. The surveys are typically carried out by government organizations, with technical support from UNICEF. (Loizillon et al., 2017).

MICS is conducted across the globe and hence this makes it possible for international comparison for Early Childhood Development (Janus, Brinkman, & Duku, 2011).

Study sample

The study sample were children aged 3 and 4 years. A total of 11,774 children were eligible for the sixth round of the Sierra Leone MICS in 2017. Of the total 11,774 children eligible for the survey, 10 of the mothers / caregivers were not interviewed. Participants for this study were 4736 children (including girls), aged 3 and 4 years and their mothers / caregivers. The total number of mothers / care givers of children aged 3 and 4 years old interviewed in rural and urban areas were 3364 (71%) and 1372 (29%) respectively.

Measures

Dependent variable

The ECDI has been collected in several Demographic and Health Surveys and other national household surveys, as well as around 80 MICS, making it the largest source of statistically sound and internationally comparable data on children's developmental outcomes in low- and middle-income countries. MICS data are gathered during face-to-face interviews in representative samples of households. ECDI, the first widely available tool for measuring the early development of 3- and 4-y-old children at the population level. Although necessarily limited in the breadth and depth of its content, the ECDI's global coverage and inclusion of developmental characteristics that are particularly amenable to early intervention provide an important opportunity for informing global ECD policy (McCoy et al., 2016).

The dependent variable or outcome variable of this study is child development measure assessed by a 10-binary fixed choice item scale (Bornstein et al., 2012) encompassing four developmental domains including literacy-numeracy, cognitive, physical and socioemotional which are further detailed below.

Literacy-numeracy domain: Literacy–numeracy has three binary (i.e., yes or no) items on the child's ability to identify or name at least ten letters, the child's ability to read at least four word and the if the child knows the name and recognizes numbers from one to ten. Data were collected by asking the following questions: Can (name) identify or name at least ten letters of the alphabet? Can (name) read at least four simple, popular words? Does (name) know the name and recognize the symbol of all numbers from 1 to 10? The response categories for each of the questions were denoted by Yes, No and Don't Know.

Cognitive / Learning domain: Two binary (i.e., yes or no) items about the child's ability to follow simple instructions and do things independently are used for a child's learning development. To enhance collecting data for this domain, the following questions were asked: Does (name) follow simple directions on how to do something correctly? When given something to do, is (name) able to do it independently? The response categories for each of these questions were Yes, No and Don't Know.

Physical domain: Physical development has two binary (i.e., yes or no) items on ability to pick up a small object with two fingers and if the child is not too sick to play. In order to collect data for this domain, the following questions were asked: Can (name) pick up a small object with two fingers, like a stick or a rock from the ground? Is (name) sometimes too sick to play? Yes, No and Do not Know, were the response categories for these questions.

Socioemotional domain: Social-emotional development has three binary (i.e., yes or no) items on whether the child: gets along with other children; does not kick, bite or hit other adults or children; and does not get distracted easily. To collect data for this domain, the following questions were asked: Does (name) get along well with other children? Does (name) kick, bite, or hit other children or adults? Does (name) get distracted easily? The response categories for each of these questions were; Yes, No and Do not Know.

The questions in the various child development domains were developed by UNICEF in 2007 and pilot-tested in Jordan, Kenya and the Philippines (UNICEF, 2011).

Criteria for a child to be considered developmentally on track

This study used the UNICEF recommended indicators for a child's literacy–numeracy, learning development, physical development, and socioemotional development for further analyses.

Literacy-numeracy : Children are identified as being developmentally on track based on whether they can identify/ name at least ten letters of the alphabet, whether they can read at least four simple, popular words, and whether they know the name and recognize the symbols of all numbers from 1 to 10. **If at least two of these are true**, then the child is considered developmentally on track.

Physical development: If the child can pick up a small object with two fingers, like a stick or a rock from the ground **and/or** the mother/caretaker does not indicate that the child is sometimes too sick to play, then the child is regarded as being developmentally on track in physical development.

Social-emotional development: Children are considered to be developmentally on track **if two of the following are true**: If the child gets along well with other children, if the child does not kick, bite, or hit other children and if the child does not get distracted easily.

Learning/Cognitive development: If the child follows simple directions on how to do something correctly **and/or** when given something to do, can do it independently, then the child is developmentally on track.

Independent variable

The independent variable also known as the predictor variable of this research is socioeconomic status (SES). Socioeconomic status was indexed by household wealth and maternal education.

Household wealth: The study used a wealth variable available in the MICS dataset that was constructed using information on household characteristics. Household wealth was assessed using questions about household characteristics including the main materials of the dwelling's floor, roof and exterior walls; main type(s) of fuel used for cooking; source of drinking water; type of sanitation facility; and 12 durable household assets. An index of household wealth was constructed based on these items using the World Bank's techniques for measuring living standards using household survey data and divided household wealth into five ordered quintiles (poorest, poorer, middle, richer and richest), that is, first being lowest wealth (poorest) and the last being highest wealth (richest). (O'donnell, Van Doorslaer, Wagstaff, & Lindelow, 2007).

Maternal education: Maternal educational attainment was assessed by calculating the years of formal schooling that the mother had completed. The following four education categories were created: pre-primary or none, primary, lower secondary, and upper secondary education and it was assessed by asking the question: What is the highest level and grade or year of school you have attended? (MICS UNICEF, 2017).

Demographic control variables

Control variables used in this study are child characteristics and area. Child characteristics include categorical variables of age (3 and 4 years) and sex (male and female). Area includes the two categories; urban and rural residence.

Data management and analysis

An extrapolate from the standard sixth round of MICS Sierra Leone 2017 dataset was used for analysis. Before analysis was done, the data was checked again for outliers and inconsistencies. The secondary data was analyzed by using the Statistical Package for Social Sciences (SPSS) version 25. Before analyses, the data was checked for discrepancies using frequencies for the categorical variables and descriptive for the continuous variable. Negatively worded items were reversed and recoded before analyses. Bivariate (chi square test) and logistic regression data analyses were performed in order to determine the association between socioeconomic status and its effect on childhood development by using data from the various domains. A Chi-square (χ^2) test of independence was performed between the independent variables (maternal education and household wealth) and each of the outcome variables or the child development domains (physical, literacy-numeracy, cognitive and socioemotional) using child age, child sex, and area of residence as control variables. Binary logistic regression predicting the likelihood of child development was performed between the independent variables (maternal education and household wealth) and each of the child development domains (physical, literacy-numeracy, cognitive and socioemotional). The binary logistic regression includes both the unadjusted model and the adjusted model. The variables included in the unadjusted model were the independent variables (maternal education and household wealth) and each of the child development domains (physical, literacy-numeracy, cognitive and socioemotional). For the adjusted model, the variables included were the independent variables (maternal education and household wealth), the control variables (child age, child sex, and area of residence) each of the child development domains (physical, literacy-numeracy, cognitive and socioemotional). All analyses excluded cases pairwise with no replacement with no replacement for missing data. For all analyses, a statistical significance level (α) of 0.05 was used.

Data quality assurance

Validity

Validity is defined as the extent to which a measurement instrument measures the intended concept accurately (Heale & Twycross, 2015; Long & Johnson, 2000). It is how accurate and meaningful are inferences based on research results. It depicts the degree to which results obtained from analysis of the data represent the phenomenon of the study or resembles the real world. Validity of the 10-item ECDI has previously been assessed using data from 12 countries, plus data on Roma subpopulations within two of these countries (the former Yugoslav Republic of Macedonia and Serbia) (Loizillon et al., 2017). Items included in the ECDI are a combined set of direct observations of the child during the field interview and parental reporting (Loizillon et al., 2017) . Zill and Ziv recommended this approach to develop an index with "the greatest validity, credibility and impact" (Zill & Ziv, 2007, p. 7). Content validity refers to the extent to which a research instrument accurately measures all aspects of a construct that it should with respect to the variable (Heale & Twycross, 2015) . Content validity had already been done and all finalized items including household wealth and maternal education and incorporated into the standard MICS instrument before the survey was carried out (Janus et al., 2011).

Reliability

Reliability is a measure of the degree to which a research instrument yields consistent results after repeated trials (Heale & Twycross, 2015). Statistical analyses were undertaken to explore the consistency and reliability of the items composing the 10-item ECDI. The results of the reliability analyses conducted from the data for each of the childhood development domains are shown in table 3.1 below. Resulting statistics included Cronbach's alpha, interitem correlation and corrected item-total correlations. Cronbach's alpha was found to be near 0.700 for the physical domain and low for the socioemotional, literacy-numeracy and cognitive domains, as shown in Table 3.1). Cronbach's alpha values range from 0 - 1, with 0.700 or higher considered acceptable indicating higher consistency, although lower values of alpha can result when there are fewer items or questions (Tavakol & Dennick, 2011). The lower values of Cronbach's alpha in the ECD domains are as a result of fewer items in the domains.

Table 4.1 Internal reliability results of the 10-item ECDI

Internal reliability results (Cronbach's alpha) of the 10-item ECDI	
ECD domain	Cronbach's alpha
Physical	0.680
Cognitive	0.403
Literacy	0.424
Socioemotional	0.459

Also, a multiple informant data collection method (that is, short observations, direct tasks with children and direct interviews with parents/caregivers) was employed to assess reliability of the items and instrument (Loizillon et al., 2017).

Generalizability

According to Green and Thorogood, generalizability is defined as the extent to which the account of a particular situation or population can be extended to other people, times or settings other than those studied (Green & Thorogood, 2018). Generalization is as an act of reasoning that involves drawing broad conclusions from particular instance by making an inference about the unobserved based on the observed (Polit & Beck, 2010). The MICS data collected is nationally representative. The Sierra Leone MICS data and study sample (children aged 3 and 4 years old) is nationally representative and hence it is likely that the results of this study can be generalized to children in Sierra Leone and perhaps to other similar contexts.

Transferability

Since the MICS is normally conducted worldwide, the study may be replicated in other countries with MICS dataset.

Ethical considerations

The survey was approved by the Ethics and Scientific Review Committee in Sierra Leone. All formal ethical procedures such as and not limited to informed consent, confidentiality and anonymity to fully respect the rights of respondents were followed prior to and after data collection by Statistics Sierra Leone, MICS UNICEF team of experts and field workers. Informed consent was sought from parents and caregivers of all children participating in the survey. Parents and caregivers were provided with information and the survey explained by the study personnel and that participation is voluntary and they have the right to refuse answering all or particular questions, as well as the right to decline from the interview at any point in time of the interview. The participants gave verbal consent after the consent form was explained. The database is well recognized and approved not only for academic use but also for research purposes. To ensure privacy, the unique identifiers such as location and names collected during interviews had been removed from the dataset. Since the MICS UNICEF website and its data are open to the general public, no additional approval was necessary to reuse the data for this study. (MICS UNICEF, 2018).

CHAPTER FIVE

RESULTS

DESCRIPTIVE RESULTS

Table 5.1 shows that most of the children aged 36 and 48 months were living in rural areas (71.0%). Slightly above twenty eight percent of children were living in poorest households and 63.7% of children had a mother with pre-primary or no education at all. The female : male ratio was 1:1.01.

Table 5.1. Characteristics of children aged 36 and 48 months (n = 4736), Sierra Leone, MICS (2017)

Characteristic		**Frequency (n)**	**Percentage (%)**
Household wealth	Poorest	1348	28.5
	Poorer	1179	24.9
	Middle	1071	22.6
	Richer	623	13.2
	Richest	515	10.9
Mother's education	Pre-primary or none	3019	63.7
	Primary	632	13.3
	Lower secondary	632	13.3
	Upper secondary	453	9.6
Sex	Female	2381	50.3
	Male	2355	49.7
Age	36 months	2360	49.8
	48 months	2376	50.2
Area	Rural	3364	71.0
	Urban	1372	29.0

Table 5.2 below lists ECDI for children aged 36 and 48 months in Sierra Leone. From the results, 91.2% of children were developmentally on track in the physical domain while only 13.3% of children were on track in the literacy-numeracy domain. The percentage of children who were developmentally on track in the cognitive and socioemotional domains were 78.9% and 59.9% respectively.

Table 5.2. ECDI for children aged 36 and 48 months (n = 4736) in Sierra Leone, MICS (2017)

Early childhood development index	**Frequency (n)**	**Percentage (%)**
Physical domain		
Child not on track of development	370	7.8
Child on track of development	4318	91.2
Cognitive domain		
Child not on track of development	957	20.2
Child on track of development	3738	78.9
Literacy-Numeracy domain		
Child not on track of development	4050	85.5
Child on track of development	632	13.3
Socioemotional domain		
Child not on track of development	1767	37.3
Child on track of development	2837	59.9

BIVARIATE RESULTS

This section presents the results from bivariate analyses between the independent variables, the control variables and each of the child development domains. See Table 5.3 for details. Table 5.3. Results from chi square tests for independence between child development domains and child sex, child age, mother's education, household wealth and area of residence. Sierra Leone – MICS 2017

		Physical Domain		Literacy-Numeracy Domain		Cognitive Domain		Socioemotional Domain	
		Child not on track	Child on track	Child not on track	Child on track	Child not on track	Child on track	Child not on track	Child on track
Sex	Male	176	2153	2001	323	478	1857	842	1447
	Female	194	2165	2049	309	479	1881	925	1390
Chi square (χ^2)		(1, n = 4688) = 0.717, p = .397, Cramer's V = 0.012		(1, n = 4682) = 0.632, p = .427, Cramer's V = 0.012		(1, n = 4695) = 0.022, p = .882, Cramer's V = 0.002		(1, n = 4604) = 4.897, p = .027, Cramer's V = 0.033	
Age (in years)	3	208	2129	2133	200	587	1754	883	1422
	4	162	2189	1917	432	370	1984	884	1415
Chi-square (χ^2)		(1, n = 4688) = 6.511, p = .011, Cramer's V = 0.037		(1, n = 4682) = 96.631, p = .000, Cramer's V = 0.144		(1, n = 4695) = 63.321, p = .000, Cramer's V = 0.116		(1, n = 4604) = 0.10, p = .944, Cramer's V = 0.001	
Mother's education level	Pre-primary or none	246	2746	2591	394	585	2408	1126	1812
	Primary	46	581	538	88	143	483	223	390
	Lower secondary	40	582	536	84	127	497	240	368
	Upper secondary	38	409	385	66	102	350	178	267
Chi-square (χ^2)		(3, n = 4688) = 2.769, p = .429, Cramer's V = 0.024		(3, n = 4682) = 0.896, p = .826, Cramer's V = 0.014		(3, n = 4695) = 4.957, p = .175, Cramer's V = 0.032		(3, n = 4604) = 1.843, p = .606, Cramer's V = 0.020	
Wealth Index	Poorest	114	1226	1274	59	319	1015	567	741
	Poorer	110	1056	1078	85	245	921	442	701
	Middle	80	986	932	130	234	831	387	662
	Richer	44	565	469	146	111	508	212	392
	Richest	22	485	297	212	48	463	159	341
Chi-square (χ^2)		(4, n = 4688) = 13.908, p = .008, Cramer's V = 0.054		(4, n = 4682) = 534.286, p = .000, Cramer's V = 0.338		(4, n = 4695) = 52.504, p = .000, Cramer's V = 0.106		(4, n = 4604) = 26.579, p = .000, Cramer's V = 0.076	
Area	Rural	278	3062	3070	255	742	2587	1294	1973
	Urban	92	1256	980	377	215	1151	473	864
Chi-square (χ^2)		(1, n = 4688) = 62.966, p = .085, Cramer's V = 0.025		(1, n = 4682) = 333.865, p = .000, Cramer's V = 0.267		(1, n = 4695) = 25.602, p = .000, Cramer's V = 0.074		(1, n = 4604) = 7.180, p = .007, Cramer's V = 0.039	

Physical Domain

Sex

From the results, 47.6% of males were not on track of development in the physical domain, while 49.9% were on track of development in the physical domain. For females, 52.4% were not on track of development in the physical domain, 50.1% were on track of development in the physical domain.

A Chi-square test for independence indicated no significant association between sex and physical domain, χ^2 (1, n = 4688) = .72, p = .397, Cramer's V = .01

Age

For children 3 years of age, 56.2% were not on track of development in the physical domain, as compared to 49.3% that are on track of development in the physical domain. For children 4 years of age, 43.8% were not on track of development in the physical domain, while 50.7% were on track of development in the physical domain.

A Chi-square test for independence indicated significant association between age and physical domain, χ^2 (1, n = 4688) = 6.51, p = .011, Cramer's V = .04

Mother's education

For mother's education, pre-primary or none, primary, lower secondary, and upper secondary education accounts for 66.5%, 12.4%, 10.8% and 10.3% respectively for children not on track in the physical domain, while pre-primary or none, primary, lower secondary, and upper secondary education accounts for 63.6%, 13.5%, 13.5% and 9.5% respectively of children on track of development in the physical domain.

A Chi-square test for independence indicated no significant association between mother's education and physical domain, χ^2 (3, n = 4688) = 2.77, p = .429, Cramer's V = .02

Wealth index

For the wealth index quintile, the poorest, poorer, middle, richer and richest accounts for 30.8%, 29.7%, 21.6%, 11.9% and 5.9% respectively of children not on track in the physical domain, while the poorest, poorer, middle, richer and richest accounts for 28.4%, 24.5%, 22.8%, 13.1% and 11.2% respectively of children on track in the physical domain.

A Chi-square test for independence indicated significant association between wealth index and physical domain, χ^2 (4, n = 4688) = 13.91, p = .008, Cramer's V = .05

Area

The rural area accounted for 75.1% of children not on track of development in the physical domain but contributed to 70.9% of children on track of development in the physical domain. The urban area accounted for 24.9% of children not on track of development in the physical domain but contributed to 29.1% of children on track of development in the physical domain.

A Chi-square test for independence indicated no significant association between area and physical domain, χ^2 (1, n = 4688) = 2.97, p = .085, Cramer's V = .03

Literacy-Numeracy Domain

Sex

From the results, 49.4% of males were not on track of development in the literacy-numeracy domain, while 51.1% were on track of development in the literacy-numeracy domain. For females, 50.6% were not on track of development in the literacy-numeracy domain, 48.9% were on track of development in the literacy-numeracy domain.

A Chi-square test for independence indicated no significant association between sex and literacy-numeracy domain, χ^2 (1, n = 4682) = 0.63, p = .427, Cramer's V = .01

Age

For children 3 years of age, 52.7% were not on track of development in the literacy-numeracy domain, as compared to 31.7% that were on track of development in the literacy-numeracy domain. For children 4 years of age, 47.3% were not on track of development in the literacy-numeracy domain, while 68.4% were on track of development in the literacy-numeracy domain.

A Chi-square test for independence indicated significant association between age and literacy-numeracy domain, χ^2 (1, n = 4682) = 96.63, p = .000, Cramer's V = .14

Mother's education

For mother's education, pre-primary or none, primary, lower secondary, and upper secondary education accounts for 64.0%, 13.3%, 13.2% and 9.5% respectively for children not on track in the literacy-numeracy domain, while pre-primary or none, primary, lower secondary, and upper secondary education accounts for 62.3%, 13.9%, 13.3% and 10.4% respectively of children on track of development in the literacy-numeracy domain.

A Chi-square test for independence indicated no significant association between mother's education and literacy-numeracy domain, χ^2 (3, n = 4682) = 0.90, p = .826, Cramer's V = .01

Wealth index

For the wealth index quintile, the poorest, poorer, middle, richer and richest accounts for 31.5%, 26.6%, 23.0%, 11.6% and 7.3% respectively of children not on track in the literacy-numeracy domain, while the poorest, poorer, middle, richer and richest accounts for 9.3%, 13.4%, 20.6%, 23.1% and 33.5% respectively of children on track in the literacy-numeracy domain.

A Chi-square test for independence indicated significant association between wealth index and literacy domain, χ^2 (4, n = 4682) = 534.29, p = .000, Cramer's V = .34

Area

The rural area accounted for 75.8% of children not on track of development in the literacy-numeracy domain but contributed to 40.3% of children on track of development in the literacy-numeracy domain. The urban area accounted for 24.2% of children not on track of development in the literacy-numeracy domain but contributed to 59.7% of children on track of development in the literacy-numeracy domain.

A Chi-square test for independence indicated significant association between area and literacy-numeracy domain, χ^2 (1, n = 4682) = 333.87, p = .000, Cramer's V = .27

Cognitive Domain

Sex

From the results, 49.9% of males were not on track of development in the cognitive domain, while 49.7% were on track of development in the cognitive domain. For females, 50.1% were not on track of development in the cognitive domain, 50.3% were on track of development in the cognitive domain.

A Chi-square test for independence indicated no significant association between sex and cognitive domain, χ^2 (1, n = 4695) = 0.02, p = .882, Cramer's V = .00

Age

For children 3 years of age, 61.7% were not on track of development in the cognitive domain, as compared to 46.9% that were on track of development in the cognitive domain. For children 4 years of age, 38.7% were not on track of development in the cognitive domain, while 53.1% were on track of development in the cognitive domain.

A Chi-square test for independence indicated significant association between age and cognitive domain, χ^2 (1, n = 4695) = 63.32, p = .000, Cramer's V = .12

Mother's education

For mother's education, pre-primary or none, primary, lower secondary, and upper secondary education accounts for 61.1%, 14.9%, 13.3% and10.7% respectively for children not on track in the cognitive domain, while pre-primary or none, primary, lower secondary, and upper secondary education accounts for 64.4%, 13.9%, 13.3% and 9.4% respectively of children on track of development in the cognitive domain.

A Chi-square test for independence indicated no significant association between mother's education and cognitive domain, χ^2 (3, n = 4695) = 4.96, p = .175, Cramer's V = .03

Wealth index

For the wealth index quintile, the poorest, poorer, middle, richer and richest accounts for 33.3%, 25.6%, 24.5%, 11.6% and 5.0% respectively of children not on track in the cognitive domain, while the poorest, poorer, middle, richer and richest accounts for 27.2%, 24.6%, 22.2%, 13.6% and 12.4% respectively of children on track in the cognitive domain.

A Chi-square test for independence indicated significant association between wealth and cognitive domain, χ^2 (4, n = 4695) = 52.50, p = .000, Cramer's V = .11

Area

The rural area accounted for 77.5% of children not on track of development in the cognitive domain but contributed to 69.2% of children on track of development in the cognitive domain. The urban area accounted for 22.5% of children not on track of development in the cognitive domain but accounted for 30.8% of children on track of development in the cognitive domain.

A Chi-square test for independence indicated significant association between area and cognitive domain, χ^2 (1, n = 4695) = 25.60, p = .000, Cramer's V = .07

Socioemotional Domain

Sex

From the results, 47.7% of males were not on track of development in the socioemotional domain, while 51.0% were on track of development in the socioemotional domain. For females, 52.3% were not on track of development in the socioemotional domain, 49.0% were on track of development in the socioemotional domain.

A Chi-square test for independence indicated a significant association between sex and socioemotional domain, χ^2 (1, n = 4604) = 4.90, p = .027, Cramer's V = .03

Age

For children 3 years of age, 50.0% were not on track of development in the socioemotional domain, as compared to 50.1% that were on track of development in the socioemotional domain. For children 4 years of age, 50.0% were not on track of development in the socioemotional domain, while 49.9% were on track of development in the socioemotional domain.

A Chi-square test for independence indicated no significant association between age and socioemotional domain, χ^2 (1, n = 4604) = 0.01, p = .920, Cramer's V = .00

Mother's education

For mother's education, pre-primary or none, primary, lower secondary, and upper secondary education accounts for 63.7%, 12.6%, 13.6% and 10.1% respectively for children not on track in the socioemotional domain, while pre-primary or none, primary, lower secondary, and upper secondary education accounts for 63.9%, 13.7%, 13.0% and 9.4% respectively of children on track of development in the socioemotional domain.

A Chi-square test for independence indicated no significant association between mother's education and socioemotional domain, χ^2 (3, n = 4604) = 1.84, p = .606, Cramer's V = .02

Wealth index

For the wealth index quintile, the poorest, poorer, middle, richer and richest accounts for 32.1%, 25.0%, 21.9%, 12.0% and 9.0% respectively of children not on track in the socioemotional domain, while the poorest, poorer, middle, richer and richest accounts for 26.1%, 24.7%, 23.3%, 13.8% and 12.0% respectively of children on track in the socioemotional domain.

A Chi-square test for independence indicated a significant association between wealth and socioemotional domain, χ^2 (4, n = 4604) = 26.58, p = .000, Cramer's V = .08

Area

The rural area accounted for 73.2% of children not on track of development in the socioemotional domain, while 69.5% of children were on track of development in the socioemotional domain. The urban area accounted for 26.8% of children not on track of development in the socioemotional domain, while 30.5% of children were on track of development in the socioemotional domain.

A Chi-square test for independence indicated no significant association between area and socioemotional domain, χ^2 (1, n = 4604) = 7.18, p = .007, Cramer's V = .04

LOGISTIC REGRESSION RESULTS

This section presents the results from logistic regression analyses between the independent variables, control variables and each of the child development domains. See Tables 5.4 – 5.7 for details.

Table 5.4 Binary Logistic regression predicting the likelihood of child development in the physical domain, Sierra Leone MICS (2017), children aged 36 and 48 months (N = 4688)

	Unadjusted Model								Adjusted Model							
	B	S.E	Wald	Df	P	OR	95% C.I. for OR		B	S.E	Wald	df	P	OR	95% C.I. for OR	
							Lower	Upper							Lower	Upper
Physical Domain																
Mother's education (No education is reference			2.49	3	.48						2.37	3	.50			
Primary	.12	.17	.52	1	.47	1.13	.81	1.57	.11	.17	.47	1	.50	1.12	.81	1.56
Lower secondary	.23	.18	1.71	1	.19	1.26	.89	1.78	.23	.18	1.72	1	.19	1.26	.89	1.79
Upper secondary	-.08	.18	.20	1	.65	.92	.64	1.32	-.07	.18	.15	1	.70	.93	.65	1.34
Wealth index (Poorest quintile is reference)			13.23	4	.01						12.63	4	.01			
Poorer	-.11	.14	.67	1	.42	.89	.68	1.17	-.11	.14	.57	1	.45	.90	.68	1.18
Middle	.14	.15	.80	1	.37	1.15	.85	1.54	.20	.16	1.47	1	.23	1.22	.89	1.67
Richer	.17	.19	.88	1	.35	1.19	.83	1.71	.38	.25	2.29	1	.13	1.46	.90	2.37
Richest	.71	.24	8.85	1	.003	2.04	1.28	3.26	.93	.30	9.72	1	.002	2.54	1.41	4.55
Control variables																
Age – 4 years									.27	.11	6.30	1	.012	1.32	1.06	1.63
Area – Urban									-.24	.19	1.54	1	.22	.78	.54	1.15
Sex – Male									.08	.11	.54	1	.46	1.08	.88	1.34

Table 5.5 Binary logistic regression predicting the likelihood of child development in the cognitive domain, Sierra Leone MICS (2017), children aged 36 and 48 months (N = 4695)

	Unadjusted Model								Adjusted Model							
	B	S.E	Wald	df	P	OR	95% C.I. for OR		B	S.E	Wald	df	P	OR	95% C.I. for OR	
							Lower	Upper							Lower	Upper
Cognitive Domain																
Mother's education (No education is reference			6.89	3	.08						7.05	3	.07			
Primary	-.22	.11	4.11	1	.043	.81	.65	.99	-.23	.11	4.54	1	.033	.80	.65	.98
Lower secondary	-.09	.11	.65	1	.42	.92	.74	1.14	-.10	.11	.77	1	.38	.91	.73	1.13
Upper secondary	-.24	.12	3.87	1	.049	.79	.62	1.00	-.24	.12	3.58	1	.058	.79	.62	1.01
Wealth index (Poorest quintile is reference)			51.06	4	.000						30.75	4	.000			
Poorer	.17	.10	3.12	1	.077	1.19	.98	1.43	.18	.10	3.44	1	.064	1.20	.99	1.45
Middle	.12	.10	1.45	1	.23	1.13	.93	1.36	.11	.10	1.06	1	.303	1.11	.91	1.36
Richer	.38	.12	9.72	1	.002	1.47	1.15	1.87	.34	.17	4.32	1	.038	1.41	1.02	1.95
Richest	1.13	.17	46.62	1	.000	3.09	2.23	4.26	1.09	.21	28.05	1	.000	2.96	1.98	4.43s
Control variables																
Age – 4 years									.59	.08	63.15	1	.000	1.81	1.56	2.09
Area – Urban									.06	.13	.20	1	.66	1.06	.82	1.37
Sex – Male									-.02	.07	.077	1	.78	.98	.85	1.13

Table 5.6 Binary logistic regression predicting the likelihood of child development in the literacy-numeracy domain, Sierra Leone MICS (2017), children aged 36 and 48 months (N = 4682)

	Unadjusted Model								Adjusted Model							
	B	S.E	Wald	df	P	OR	95% C.I. for OR		B	S.E	Wald	df	p	OR	95% C.I. for OR	
							Lower	Upper							Lower	Upper
Literacy-numeracy Domain																
Mother's education (No education is reference			1.77	3	.62						1.42	3	.70			
Primary	.02	.14	.01	1	.91	1.02	.78	1.32	-.001	.14	.00	1	1.00	1.00	.76	1.31
Lower secondary	-.15	.14	1.16	1	.28	.86	.66	1.13	-.13	.14	.81	1	.37	.88	.67	1.16
Upper secondary	-.13	.15	.70	1	.40	.88	.65	1.19	-.14	.16	.77	1	.38	.87	.64	1.19
Wealth index (Poorest quintile is reference)			425.89	4	.000						159.79	4	.000			
Poorer	.53	.17	9.32	1	.002	1.70	1.21	2.40	.55	.18	9.69	1	.002	1.73	1.22	2.44
Middle	1.11	.16	46.36	1	.000	3.03	2.20	4.17	1.06	.17	38.75	1	.000	2.88	2.06	4.01
Richer	1.92	.16	136.81	1	.000	6.80	4.93	9.37	1.73	.21	68.96	1	.000	5.64	3.75	8.48
Richest	2.75	.16	291.04	1	.000	15.64	11.40	21.45	2.58	.21	146.16	1	.000	13.17	8.67	20.00
Control variables																
Age – 4 years									.99	.10	103.98	1	.000	2.70	2.23	3.27
Area - Urban									.28	.15	3.69	1	.055	1.33	.99	1.77
Sex - Male									.04	.09	.20	1	.657	1.04	.87	1.25

Table 5.7 Binary logistic regression predicting the likelihood of child development in the socioemotional domain, Sierra Leone MICS (2017), children aged 36 and 48 months (N = 4604)

	Unadjusted Model								Adjusted Model							
	B	S.E	Wald	df	P	OR	95% C.I. for OR		B	S.E	Wald	Df	p	OR	95% C.I. for OR	
							Lower	Upper							Lower	Upper
Socioemotional Domain																
Mother's education (No education is reference			2.76	3	.43						2.61	3	.455			
Primary	.08	.09	.67	1	.42	1.08	.90	1.29	.07	.09	.61	1	.437	1.08	.90	1.29
Lower secondary	-.08	.09	.67	1	.41	.93	.78	1.11	-.07	.09	.65	1	.419	.93	.78	1.11
Upper secondary	-.11	.11	1.11	1	.29	.90	.73	1.10	-.11	.11	1.07	1	.302	.90	.73	1.10
Wealth index (Poorest quintile is reference)			27.34	4	.000						20.83	4	.000			
Poorer	.19	.08	5.47	1	.019	1.21	1.03	1.43	.20	.08	5.59	1	.018	1.22	1.03	1.43
Middle	.28	.09	10.43	1	.001	1.32	1.11	1.56	.30	.09	11.36	1	.001	1.35	1.13	1.61
Richer	.36	.10	12.04	1	.001	1.43	1.17	1.74	.45	.14	11.00	1	.001	1.57	1.20	2.06
Richest	.51	.11	20.58	1	.000	1.66	1.33	2.06	.62	.15	17.04	1	.000	1.85	1.38	2.48
Control variables																
Age – 4 years									-.01	.06	.02	1	.891	.99	.88	1.12
Area – Urban									-.12	.11	1.28	1	.257	.89	.72	1.09
Sex – Male									.13	.06	4.35	1	.037	1.14	1.01	1.28

Physical Domain

Direct logistic regression was performed to assess the impact of socioeconomic factors on the physical domain of child development. The initial and unadjusted model contained two independent variables (mother's level of education and household wealth index). The full unadjusted model containing both predictors was statistically significant, χ^2 (7, N = 4688) = 17.86, $p < .013$, indicating that the unadjusted model was able to distinguish between children on track of physical development and children not on track of physical development. The overall unadjusted model explained between 0.4% (Cox and Snell R square) and 0.9% (Nagelkerke R square) of the variance in physical child development and correctly classified 92.1% of children. As shown in table 2, only one of the two independent variables made a unique statistically significant contribution to the model (wealth index). The richest household in the wealth index quintile was a strong predictor of physical child development, recording an odds ratio of 2.04. This indicated that respondents from households in the richest wealth quintile were over 2 times more likely to report child on track of physical development than those from households in the poorest wealth quintile, controlling for the other factor in the model.

In a second and adjusted model, the control variables child age, gender and area of residence were added. The full adjusted model containing the predictors and control variables was statistically significant, χ^2 (10, N = 4688) = 26.29, $p < .013$, indicating that the adjusted model was able to distinguish between children on track of physical development and children not on track of physical development. The overall adjusted model explained between 0.6% (Cox and Snell R square) and 1.3% (Nagelkerke R square) of the variance in physical child development and correctly classified 92.1% of children. As shown in table 2, only one of the two predictor variables made unique statistically significant contribution to the adjusted model. The richest household in the wealth index quintile was a strong predictor of physical child development, recording an odds ratio of 2.54. This indicated that respondents from households in the richest wealth quintile were over 2.5 times more likely to report child on track of physical development than those from households in the poorest wealth quintile. Of the control variables, only age made statistically significant contribution to the adjusted model recording an odds ratio of 1.32.

Cognitive Domain

Direct logistic regression was performed to assess the impact of socioeconomic factors on the cognitive domain of child development. The initial and unadjusted model contained two independent variables (mother's level of education and household wealth index). The full unadjusted model containing both predictors was statistically significant, χ^2 (7, N = 4695) = 66.26, $p < .001$, indicating that the unadjusted model was able to distinguish between children on track of cognitive development and children not on track of cognitive development. The overall unadjusted model explained between 1.4% (Cox and Snell R square) and 2.2% (Nagelkerke R square) of the variance in a child's cognitive development and correctly classified 79.6% of children. As shown in table 3, the two independent variables made unique statistically significant contributions to the unadjusted model (mother's education and wealth index). The richest and richer in the wealth index quintile were the strongest predictors of a child's cognitive development, recording odds ratios of 3.09 and 1.47 respectively. This indicated that respondents from households in the richest wealth quintile were over 3 times more likely to report child on track of cognitive development than those from households in the poorest wealth quintile, and respondents from richer wealth index quintile household were over 1.4 times more likely to report child on track of cognitive development than those from households in the poorest wealth quintile controlling for the other factor in the model. The odds ratio of .81 for primary education in mother's level of education indicated that respondents with primary education were less likely to report child on track of cognitive development than those with no education controlling for the other factor in the model.

In a second and adjusted model, the control variables child age, gender and area of residence were added. The full adjusted model containing the predictors and control variables was statistically significant, χ^2 (10, N = 4695) = 131.04.29, $p < .001$, indicating that the adjusted model was able to distinguish between children on track of cognitive development and children not on track of cognitive development. The overall adjusted model explained between 2.8% (Cox and Snell R square) and 4.3% (Nagelkerke R square) of the variance in cognitive development and correctly classified 79.6% of children. As shown in table 3, only one of the two predictor variables made unique statistically significant contribution to the adjusted model. The richest and richer in the wealth index quintile were the strongest predictors of a child's cognitive development, recording odds ratios of 2.96 and 1.41 respectively. This indicated that respondents from households in the

richest wealth quintile were over 2.9 times more likely to report child on track of cognitive development than those from households in the poorest wealth quintile, and respondents from richer wealth index quintile household were over 1.4 times more likely to report child on track of cognitive development than those from households in the poorest wealth quintile. Of the control variables, only age made statistically significant contribution to the adjusted model recording an odds ratio of 1.81.

Literacy-Numeracy Domain

Direct logistic regression was performed to assess the impact of socioeconomic factors on the literacy-numeracy domain of child development. The initial and unadjusted model contained two independent variables (mother's level of education and household wealth index). The full unadjusted model containing both predictors was statistically significant, χ^2 (7, N = 4682) = 461.07, $p < .001$, indicating that the unadjusted model was able to distinguish between children on track of literacy-numeracy development and children not on track of literacy-numeracy development. The overall unadjusted model explained between 9.4% (Cox and Snell R square) and 17.2% (Nagelkerke R square) of the variance in a child's literacy-numeracy development and correctly classified 86.5% of children. As shown in table 4, only one of the two independent variables made a unique statistically significant contribution to the model (wealth index quintile). The richest in the wealth index quintile was the strongest predictor of a child's literacy-numeracy development, recording an odds ratio of 15.64. This indicated that respondents from households in the richest wealth quintile were over 15 times more likely to report child on track of literacy-numeracy development than those from households in the poorest wealth quintile, controlling for the other factor in the model. The odds ratio of 6.80 for the richer in the wealth index quintile indicated that respondents were over 6 times more likely to report child on track of literacy-numeracy development than from households in the poorest wealth quintile, controlling for the other factor in the model.

In a second and adjusted model, the control variables child age, gender and area of residence were added. The full adjusted model containing the predictors and control variables was statistically significant, χ^2 (10, N = 4682) = 576.32, $p < .001$, indicating that the adjusted model was able to distinguish between children on track of literacy-numeracy development and children not on track

of literacy-numeracy development. The overall adjusted model explained between 11.6% (Cox and Snell R square) and 21.2% (Nagelkerke R square) of the variance in literacy-numeracy development and correctly classified 87.0% of children. As shown in table 4, only one of the two predictor variables made unique statistically significant contribution to the adjusted model. The richest and richer in the wealth index quintile were the strongest predictors of a child's literacy-numeracy development, recording odds ratios of 13.17 and 5.64 respectively. This indicated that respondents from households in the richest wealth quintile were over 13 times more likely to report child on track of literacy-numeracy development than those from households in the poorest wealth quintile, and respondents from richer wealth index quintile household were over 5.6 times more likely to report child on track of literacy-numeracy development than those from households in the poorest wealth quintile. Of the control variables, only age made statistically significant contribution to the adjusted model recording an odds ratio of 2.70.

Socioemotional Domain

Direct logistic regression was performed to assess the impact of socioeconomic factors on the socioemotional domain of child development. The initial and unadjusted model contained two independent variables (mother's level of education and household wealth index). The full unadjusted model containing both predictors was statistically significant, χ^2 (7, N = 4604) = 29.42, $p < .001$, indicating that the model was able to distinguish between children on track of socioemotional development and children not on track of socioemotional development. The overall unadjusted model explained between 0.6% (Cox and Snell R square) and 0.9% (Nagelkerke R square) of the variance in a child's socioemotional development and correctly classified 61.6% of children. As shown in table 5, only one of the two independent variables made a unique statistically significant contribution to the unadjusted model (wealth index). The richest and richer in the wealth index quintile were the strongest predictor of a child's socioemotional development, recording an odds ratio of 1.66 and 1.43 respectively. This indicated that respondents from households in the richest wealth quintile were over 1.6 times more likely to report child on track of socioemotional development than those from households in the poorest wealth quintile, controlling for the other factor in the model.

In a second and adjusted model, the control variables child age, gender and area of residence were added. The full adjusted model containing the predictors and control variables was statistically significant, χ^2 (10, N = 4604) = 35.08, $p < .001$, indicating that the adjusted model was able to distinguish between children on track of socioemotional development and children not on track of socioemotional development. The overall adjusted model explained between 0.8% (Cox and Snell R square) and 1.0% (Nagelkerke R square) of the variance in socioemotional development and correctly classified 61.6% of children. As shown in table 5, only one of the two predictor variables made unique statistically significant contribution to the adjusted model. The richest and richer in the wealth index quintile were the strongest predictors of a child's socioemotional development, recording odds ratios of 1.85 and 1.57 respectively. This indicated that respondents from households in the richest wealth quintile were over 1.8 times more likely to report child on track of socioemotional development than those from households in the poorest wealth quintile, and respondents from richer wealth index quintile household were over 1.5 times more likely to report child on track of socioemotional development than those from households in the poorest wealth quintile. Of the control variables, only sex made statistically significant contribution to the adjusted model recording an odds ratio of 1.14.

CHAPTER SIX

DISCUSSION

This study explored the association of socioeconomic factors (maternal education and household wealth) and early childhood development (physical, cognitive, literacy-numeracy and socioemotional) in a nationally representative sample of children 3 and 4 years old from Sierra Leone. From the results, household wealth and age of child emerged as the most important predictors of early child development. Household wealth was positively and significantly associated with all the early childhood development variables and with the strongest relationship shown for the literacy-numeracy domain. Similarly, age of child was positively and significantly associated with all the early childhood development variables except for the socioemotional development where it was negatively and significantly associated with early childhood development.

In contrast, sex of child, area and maternal education were not significant in early childhood development variables except for the cognitive development where maternal education was negatively and significantly associated with early childhood development and socioemotional development where sex of child was positively and significantly associated with early childhood development.

Role of household wealth in early childhood development among children 3 and 4 years in Sierra Leone

Physical Development

From the results, the richest household wealth quintile was positively and significantly associated with physical development in early childhood even when the controls were added to the model, consistent with previous study (Duc, 2016). The poorer household wealth quintile was negatively and not significantly associated with child's physical development in early childhood, meaning that efforts to promote physical development in early childhood may be more important among the poorer and poorest household quintiles. Applying the ecological framework, children (microsystem) from the richest household wealth (exosystem) tend to be developmentally on track of physical development. The reason for this might be that children living in wealthy households

are likely residing in affluent areas where more facilities such as quality health services (exosystem), stimulating environments (exosystem) are available that foster the physical development of a child.

Cognitive Development

The association of SES with cognitive ability is well established with robust finding across cultures (Brody, 1992; Jensen, 1998). It is perhaps, then not surprising to discover in the current study that household wealth (exosytem) significantly influences early childhood cognitive development. The effects of SES (exosystem) on cognitive development of children are well known (Hackman & Farah, 2009; Hackman et al., 2010; Hoff, 2003). Children (microsystem) who grow up in families (microsystem) with lower SES are at increased risk of reduced psychological well-being and emotional and cognitive development. SES may affect neural development through a variety of different mediators, such as prenatal factors, parental care, cognitive stimulation, nutrition, stress, toxins and drugs exposure (Hackman et al., 2010). In the present study, children (microsystem) from the richest and richer households (exosystem) might have had access to books as well as stimulating activities by their parents (microsystem) that might have been associated with cognitive development, consistent with extensive evidence that reading books and home stimulation are positively associated with children's cognitive development (Bradley and Corwyn 2005; Hamadani et al. 2010; Maulik and Darmstadt 2009). In addition to household wealth (exosystem), children (microsystem) from richest and richer household might have enjoyed the luxury of their parents teaching, consistent with responsive parenting activities with children such as reading, singing, and playing are associated positively with language development, cognitive performance, and social abilities (Yousafzai et al. 2014). Also, involvement of parents (microsystem) is positively associated with cognitive and socio-emotional development (Maggi et al. 2010).

In addition to household wealth (exosystem), the home environment might have contributed to the children's (microsystem) cognitive development. Perhaps the children from the richest and richer households might be growing up in a well-ordered home where they might be able to explore and interact in that environment in ways that stimulate cognitive advances. On the flip side, may be a chaotic home environment is a marker for parenting stress for instance among other family

level risk factors that might had resulted in parent-child interactions lacking adequate nurturing of child's cognitive development as demonstrated by the current study for children in the poorest and poorer households (exosystem), consistent with evidence that family level risk factors have a negative impact on children's cognitive functioning (Leventhal & Brooks-Gunn, 2000).

Literacy-numeracy related development

One very interesting finding is that respondent from households in the richest quintile (exosystem) were over 15 times more likely to report child (microsystem) on track of literacy-numeracy than those from households in the poorest wealth quintile. This high disparity maybe explained by the very big gap between the richest and the poorest. The richest may have available resources to provide such as nutritious foods, toys, reading bookings, and spend time with their children among others that will be an advantage for children from the richest wealth quintile over children from the poorest quintile, consistent with previous studies (Bradley & Corwyn, 2002; Paxson & Schady, 2007). Therefore, if families from the poorest quintile (exosystem) had similar available resources to provide for their children, their children are likely to reap the benefit of literacy-numeracy. Another reason might be societal circumstances in addition to the socioeconomic status of the family. Social resources are not equally distributed between urban and rural areas. Inadequate social resources (microsystem) in rural areas such as health facilities, schools, water supply among others compounded by poverty might have being the cause of such disparity in literacy-numeracy. This was captured in the result as there was a significant effect of urban living on child development for literacy-numeracy which suggest that support and resources favouring early childhood development might be more likely located in urban areas that in rural areas, consistent with a body of research about the importance of the proximity of resources to children for ECD (Bradley et al. 2001; Bradley and Putnick 2012). Further, the disparity in literacy-numeracy development may be that parents of children from richest households can afford reading books for their children (Bradley and Corwyn 2005; Hamadani et al. 2010; Maulik and Darmstadt 2009) and may be they are regularly involved in teaching activities with their children (microsystem) that might be associated with early childhood development, consistent with Roberts et al (2005).

Socioemotional development

Household wealth (exosystem) was positively and significantly associated with children's (microsystem) socioemotional development regardless of the level in the wealth index quintile. From the poorest to the richest in the wealth index quintile contributed significantly to children's socioemotional development. The reason for this might be, parents (mircorystem) from both poorest and richest households (exosystem) might had been involved in responsive parenting activities with their children such as storytelling, singing, playing and dancing that are positively associated with social abilities and socio-emotional development, consistent with previous studies (Yousafzai et al. 2014; Maggi et al. 2010; Bradley & Corwyn 2005).

Role of maternal education in early childhood development among children 3 and 4 years in Sierra Leone

Physical Development

From the results, there was no significant association between maternal education level (exosystem) and early childhood physical development. Upper secondary maternal education interacted negatively with children's (microsystem) physical development, meaning that promotion of physical development in early childhood may be more important among mothers with low education. These results contradict previous studies (Curtin, Madden, Staines, & Perry, 2013; Fernald et al., 2011). The reason for the contradicting finding may be attributed to poor quality of formal education of the women or may be education is more important for other childhood developmental domains compared to the physical development domain.

Cognitive Development

Results from the current study showed significant negative relationship between primary maternal level of education (exosystem) and child's (microsystem) cognitive development in both the adjusted and unadjusted models, meaning that promotion of cognitive development in early childhood may be more important among mothers of low education. The significant negative association between upper secondary maternal level of education diminishes in the adjusted model. The lack of significant positive association between mother's level of education and early childhood development in this current study was somehow surprising, as it contradicted teaching activities by the mother (microsystem) to help children master cognitive skills such as distinguishing print in books and identifying words as mentioned by a large body of similar research (Roberts, Jergens, & Burchinal, 2005; Snow, 2006). Some of the reasons attributed to the findings might be related to the categorical nature of maternal level of education variable included in the study. Also, the maternal level of education might have not been sensitive enough to capture variations in early childhood development which were dependent on maternal level of education. Furthermore, the maternal level of education might lack specific knowledge, skills or practices related to children's need such as health & nutrition, early learning, and responsive caregiving (Black et al., 2017) that could influence early childhood development.

Literacy-numeracy related development

For the literacy-numeracy development, there was no association with maternal level of education (exosystem) in the current study. Lower secondary and upper secondary maternal education levels interacted negatively with children's literacy-numeracy related development in early childhood, meaning that promotion of literacy-numeracy development in early childhood may be more important among mothers of low education. The lack of positive and significant association between mother's level of education and early childhood development in this current study contradicted teaching activities by the mother to help children (microsystem) in recognizing letters and numbers which is associated with literacy-numeracy development as mentioned by a large body of similar research (Roberts et al., 2005; Snow, 2006).

Socioemotional development

From the result, child's socioemotional development was not significantly associated with maternal level of education (exosystem). Lower secondary and upper secondary maternal levels of education interacted negatively with children's (microsystem) socioemotional development, but they were not significantly associated, meaning that promotion of socioemotional development in early childhood may be more important among mothers with low education.

The influence of other variables

Age

From the results, age of child emerged as one of the predictors of early childhood development and this is consistent with a regional study of eight countries in Central and West Africa including Sierra Leone that ECDI increased with age (Coury, Ndabananiye, & Tossou, 2014).

Area

From the results, children residing in urban areas were more likely to be developmentally on track of early childhood development when compared with their rural counterpart. This is consistent with previous studies (Coury, Ndabananiye, & Tossou, 2014; Duc, 2016).

Gender

The results show that the sex of a child was positively and significantly associated with early childhood development. The boy child is more likely to be developmental on track compared with the girl child which is consistent with previous study (Duc, 2016).

Methodological considerations

The study has several limitations that should be kept in mind in interpreting the results. First, the study was of children 36 and 48 months of age and so findings might not be generalized to other age group. Also, there might have been reporting bias from parents or caregivers about the child, especially regarding the child's behaviour or abilities. Last, it is important to note that the data were cross-sectional; limiting the possibility of causal inferences between the variables under study, future analyses using longitudinal data could shed light on this.

Despite these limitations, the results suggest that household wealth is significantly associated with all the four domains of early childhood development. The effect is not dramatic, but still significant in the face of controls, including age, sex and area. This study had highlighted association between socioeconomic status and early childhood development in Sierra Leone and had brought about renewed focus on maternal education and household wealth in early childhood development in Sierra Leone. There are limited literatures on this aspect in Low- and Middle-Income Countries (LMIC), this study contributes to fill the gap in literature not only in Sierra Leone but also in LMIC in general. Regardless of these limitations, the present study provides important information on areas where investment and intervention are need in order to enable children in Sierra Leone to achieve their full developmental potential.

Implication for Health Promotion and Development

Tradition, cultural practices, socioeconomic constraints pose significant challenges for health promotion and this requires an integrated and concerted ecological approach that can be used to empower families and communities to adopt better ways of nurturing children with the aim of advocating for change that may be needed for children to attain their full potential in early childhood development. It is only through this that the SDGs 3 and 4 set by the United Nations can be achieved by getting the best out of children at preliminary stage of development in life. Further, the Ottawa Charter states that for improvement to health to be attained, the prerequisites of health need to be met and this cannot be ensured by the health sector alone. This requires holistic integrated efforts between multiple settings but with coordinated action by all the parties concerned by creating programs and policies to improve or address socioeconomic status in early childhood development. The importance of socioeconomic status deserves greater emphasis in public policies designed to promote early childhood development and future research studies should consider additional dimensions of children's development across a broader age range for policy purposes, but also providing feedback to mothers or caregivers aiming to understand individual children's developmental wellbeing.

Conclusion

Given the results of this study, SES does have a correlation with early childhood development. The higher the maternal level of education and household income are, the better the early childhood development and the reverse is true. The positive link between SES and early childhood development is well established (Bradley & Corwyn, 2002).

For children to achieve their full developmental potential globally, early childhood development is crucial. There is a great scarcity of broad understanding of the risks and resources for optimal early childhood development in not only Sierra Leone but also in LMIC which is necessary for early childhood development. The benefits of early childhood development have become increasingly evident over the past decades from the MDGs to the SDGs. Despite some limitations, the present study found that in the unadjusted regression model household wealth was a strong predictor early childhood development. In the adjusted model, household wealth was a strong predictor of early childhood development and age made significant contribution to the model in predicting early childhood development. This study provides new evidence of sharp differences in the various early childhood domains by socioeconomic status. The present findings may be relevant to other similar geographical settings and of interest to health professionals when assessing children with different problems related to full developmental potential. The results suggest that improving SES should be the main goal of health literacy promotion if children were to reach their full developmental potential. According to Heckman (2012), the highest rate of return in early childhood development comes from investing as early as possible, from birth through age five, in disadvantaged families. Considering this result, policy interventions to improve maternal education and household wealth especially for the most vulnerable and underprivileged children are needed to improve children's cognitive, physical, literacy and socioemotional well-being in Sierra Leone.

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APPENDIX

APPENDIX I: Map of Sierra Leone

Source: Retrieved from https://www.worldatlas.com/maps/sierra-leone on 19/11/2020.