



Cognitive function and associated factors among school age children in Goba Town, South-East Ethiopia



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ABSTRACT

This study aimed to assess cognitive function and associated factors among school age children in Goba Town, South-Eastern Ethiopia. School based cross-sectional study was employed on 131 school children age 8–11 years. Cognitive function was assessed by Kaufman Assessment Battery for Children (KABC-II) and Ravens colored progressive matrices (Raven's CPM) test. Descriptive statistics, independent *t* test, one way ANOVA and logistic regression were used in statistical analysis. The mean ($\pm$ SD) score of Raven's CPM test and triangles test was 22.02 ($\pm$ 4.79) and 15.17 ($\pm$ 3.24) respectively. The mean ($\pm$ SD) for short term memory measures such as word order, hand movement number recall was 15.66 ($\pm$ 3.03), 9.09 ($\pm$ 2.88) and 8.91 ($\pm$ 2.19) respectively. The mean score ($\pm$ SD) of pattern score was 9.63 ($\pm$ 4.43). There was a statistically significant mean difference in hand movements and pattern score between those children who currently used iodized salt and non iodized salt ($p < 0.05$). Wealth index was associated with rovers score ($P = 0.044$). Breakfast consumption was statistically associated with triangles ($P < 0.001$). Those children who had eaten breakfast less than seven days in last week had above 3 times higher odd to score RPM below average (AOR = 3.05; 95% CI: 1.07–8.68). This might implicates that promotion of iodized salt intake, improving dietary diversity, improving breakfast eating habit, and improving wealth index are important modifiable factors of cognitive function.

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1. Introduction

Cognitive impairments that resulted during preschool years were irreversible. Cognitive function of school age children can be affected by several factors such as nutritional status, demographics, and socio-economic factors (Anuar, Lim, Low, & Harun, 2005; Zaliyah, Bond, & Johnson, 2000).

Globally, there were more than 200 million stunted school age children with risk of impaired physical and mental development (Grantham-McGregor et al., 2007). In poor countries, malnutrition is considered as a major problem that limits the ability of children to learn and causes them to eventually perform at a lower level (Galal & Hullet, 2003). Studies showed that children who were malnourished in early life are more likely to have lower schooling attainment and to score poorly in cognitive tests during school age as compared to well-nourished children (Alaimo, Olson, & Frongillo, 2001; Alderman

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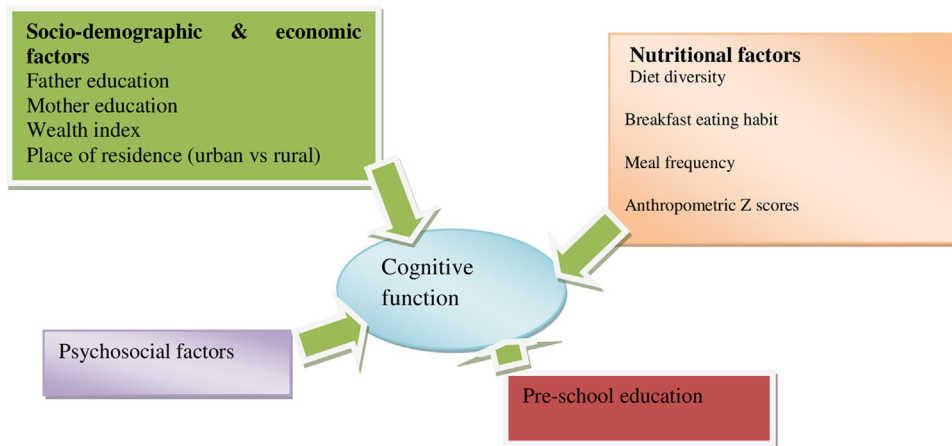


Fig. 1. Conceptual frame work that describe the association of socio-demographica factors, economic factors and nutritional status with cognitive function.

et al., 2006; Glewwe, 2005; Glow et al. 2001; Walker et al., 2000). Growth retardation in early childhood is associated with significant functional impairment in school age and adult life, and reduced work capacity, thus affecting economic productivity (DeOnis, 2000).

Socio-economic status is also one of the most important factors that may influence the development of children. Parental education, occupation, income, and health service facilities; would all influence the growth of children. The environment of children of higher socio-economic groups may provide opportunity for gaining knowledge and help children to be quick to learn. However in low socio-economic status groups, there may be more opportunity to master self help skills and gain independence (Aughinbaugh & Gittleman, 2003; Baum, 2003; Berger et al., 2006).

In developing countries like Ethiopia, millions of school children suffer from nutritional deficiencies and frequent infections which can have a negative effect on their cognitive, motor, and behavioral development (Lee, 2003). Because the foundation of good health and sound mind is laid during the preschool and school age periods, early age is a basic milestone in the life of an individual and is responsible for many changes that take place during later life. Children who fail to grow optimally during this crucial period may not make-up the loss in growth even if they consume an excellent diet in later life (Pollitt, 1996).

From the literature review made for this study, we have developed the conceptual frame work that describes the association of socio-demographic factors, economic factors and nutritional status with cognitive function (Fig. 1). This study hypothesized that socio-demographic, economic and nutritional factors are associated with cognitive performance of school age children. Understanding of the child's cognitive abilities and identifying the modifiable factors is critical to establishing intervention goals and to planning therapeutic activities. Screening of cognitive abilities and associated factors is essential for a comprehensive understanding of the child's abilities and limitations. This study aimed to investigate factors associated with cognitive performance among school age children in Goba Town, Southeast Ethiopia.

2. Methods

2.1. Study setting and design

Institutional based cross-sectional study design was employed among 131 school age children (6–11 years) in Goba Town, Bale zone, Oromia region, South east Ethiopia. The study was conducted from May to June 2014. School age children who have health problems (like visual impairment, hearing impairment and severe mental problems) were excluded.

The sample size (n) for this study was determined by using G power statistical software version 3.1.5 (Faul, Erdfelder, Lang, & Buchner, 2007) with the following assumptions. Assuming the effect size of 0.24, the level of significance (α), 0.05 ($Z_{\alpha/2} = 1.96$) and the power efficiency ($1 - \beta$) 100% is 80% ($\beta = 0.80$). The software gives total sample size of 103 for study subjects. Considering 10% non-response rate, the total sample size ($n = 121$), which is the minimum sample size needed to detect difference in cognitive performance of malnourished and well nourished school age children. Actually the study was conducted on 131 school age children.

The sampling procedure was started with the stratification of the schools in to public schools and private schools by assuming there is a socioeconomic difference between strata. Five primary schools (two from public and three from private) were taken randomly. The total number and list of students were obtained from each selected school. Proportional allocation was made to determine the number of students included in the study from each school. The same procedure was followed to determine the number of students in each class of the school and finally students were selected using simple random

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