Prevalence and sociodemographic determinants of developmental delay: a cross-sectional study of under-five Nigerian children

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Abstract

Background: Most developmental problems or delays are preventable and others may be ameliorated by interventions. Developmental delay and factors associated with it therefore need to be identified in order for early and appropriate interventions to be instituted. This study therefore aimed to determine the prevalence of developmental delay among under-fives and identify the sociodemographic factors associated with the delay.

Methods: Four hundred and fifteen Nigerian children, aged 6-59 months were assessed for development using the Schedule of Growing Skills II tool. Developmental quotient below threshold point of 85% in a developmental domain was used to define developmental delay.

Results: Of the 415 children assessed, 147 (35.4%) had delay in the various developmental domains. The highest prevalence was in the manipulative domain (25.8%) followed by visual (17.1%), cognitive skill (13.5%), hearing and language (6.3%), interactive social (5.8%), self-care social (4.4%) and speech and language (4.1%). Low maternal education was significantly associated with delay in locomotive domain (4.3%; OR=5.00; 95% CI=1.04-23.84), manipulative domain (32.4%; OR=1.89; 95%CI=1.21-2.95), visual domain (22.9%; OR=2.11; 95% CI=1.25-3.55), speech and language (6.4%; OR=3.03; 95% CI=1.05-8.75), interactive social (8%; OR=3.05; 95% CI=1.32-7.04), self-care social (6.9%; OR=3.30; 95% CI=1.15-9.43), cognitive (17.6%; OR=1.89; 95% CI= 1.07-3.35). Birth order and household size also had significant association with delay in various domains. There was no significant association between socioeconomic class and developmental delay in any of the domains.

Conclusion: The study showed that developmental delay was relatively common among under-five children in North-West Nigeria; and has a strong association with some socio-demographic factors. There is need to screen children for developmental delay for early intervention.

Key words: Child Development, Developmental Delay, Developmental Domain, Developmental Skills, Under-Fives, Sociodemograhic factors.

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Introduction

Development is the progressive acquisition of physical (motor), cognitive (thought), linguistic (communication) and social (emotional) skills and/or attitudes. A child is said to have developmental delay when he/she exhibits a significant delay in the acquisition of one or more these skills.[1] A significant delay has been traditionally defined as discrepancy of 25% or more from the expected rate, or a discrepancy of 1.5 to 2 standard deviations from the norm.[1]

During the first five years of life, children lay the groundwork for lifelong development.[2] This development, and invariably long-term adult productivity, is determined by multidirectional interactions between genetic factors and environmental factors over time.[3,4] These interactions, in turn, allow for new developmental capacities.[5] The dynamic interplay between these factors also suggests that development is easily influenced by appropriate interventions directed at the child, his/her environment or both. Environmental or sociodemographic factors that have been shown to influence various aspects of child development include parent-child relationship, maternal education, family size, socioeconomic class and nutritional status.[5,6,7] Cultural variations in rearing conditions have also been identified as a major factor influencing motor development during infancy and childhood.[8,9]

To improve the outcome of children identified with delay, it is critical to assess them during the vulnerable period of development in order to determine if they are developing appropriately; identify possible risk factors militating against their optimal development and institute interventions that will reduce risk exposure. This study therefore aimed to assess otherwise healthy under-five children for developmental delay and to determine its association with their sociodemographic characteristics.

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Materials and Methods

Study Area and Participants

This community-based, cross-sectional study was conducted at selected preschools (crèches, daycares, playgroups and nurseries) and immunization centers in Zaria metropolis between the months of November 2013 and May 2014. Zaria metropolis a semi-urban area, located within the Guinea Savannah belt of Nigeria, about 70 kilometres north of Kaduna, the capital city of Kaduna State, northwestern Nigeria. The ancient old city of Zaria is predominantly inhabited by the Hausa-Fulanis, while the other parts of this semi-urban region is made up of a heterogeneous group of settlers from the major and minor ethnic groups of Nigeria.

A multistage sampling method was used to select the pre-schools and immunization centers while systematic sampling method was used to recruit the subjects. All children aged 6 to 59 months who had Nigerian parentage and whose caregivers consented were included. Children previously diagnosed for developmental delay or with obvious delay from neurological causes, chromosomal abnormalities or physical disabilities were excluded from the study.

The sample size was determined using the formula for estimation of prevalence: $n = z^2pq/ d^2$Where 'n' is the desired sample size, 'z' is the standard normal deviation corresponding to 95% confidence interval = (1.96), 'p' is the prevalence of developmental delay assumed to be 50% since no previous published study in Nigeria was found=(0.5), 'q' = 1- p (the proportion of children without developmental delay) = (0.5), 'd' is the degree of accuracy desired = (0.05).

Therefore, $n= (1.96)^2\times0.50\times0.50/ (0.05)^2 = 384$ children

Allowance of 10% was made for non-response: n= 10/100 x 384 = 38.4+ 384 = 422 children.

Ethical Consideration

Approval of the Scientific and Health Research Ethics Committee of the Ahmadu Bello University Teaching Hospital Zaria, Primary School Management Board, school heads and heads of administration of the immunization centers was obtained. Written consent was obtained from the parents/caregivers of the participating children. A plan of support and intervention was discussed with the parents of the children found to have developmental delay. Where referral was required, the child was referred to the appropriate referral center.

All the provisions of the Helsinki declaration were duly observed. [10]

Data Collection

The sociodemographic data was collected from the parents/guardians of all children enrolled for the study by interview method and recorded on a pre-structured questionnaire. The information obtained included the child's biodata and family/social history. Each child was assigned a socioeconomic class using the method recommended by Olusanya *et al.*[11] The developmental domains were assessed with the Schedule of Growing Skills II (SGS II) screening tool (GL Assessment Ltd., London,).[12] Face validation and content validation of the tool were done prior to the study.

Developmental Assessment

SGS II is a developmental screening tool based on developmental sequences designed by Dr Mary Sheridan.[12] It is a product of several years of research, development, modifications, standardization and trials on children throughout the United Kingdom. The SGS II was designed to be a quick and easy tool for the developmental screening of children aged from birth to five years. It provides information on whether the child is developing normally and identifies which skill areas the child is delayed in.

The SGS II tool [12] consists of 179 items, divided into 10 skill areas (domains): passive postural, active postural, locomotor skills, manipulative skills, visual skills, hearing and language skills, speech and language skills, interactive social skills, self-care social skills and cognitive skills. The items making up the cognitive skills are included in the 9 skills. It takes approximately 20 - 30 minutes for a full assessment.

When all relevant skill areas on the SGS II 'Record form' were completed and the scores totaled, they were transferred unto a 'Profile form' from where the equivalent developmental age was obtained. The developmental quotient (DQ) was obtained using the formula: DQ (%) = developmental age/chronological age multiplied by 100

Each child was classified according to the score of developmental quotient: [13] 85% and above as normal, 71-84% as mild-moderate delay while 70% and below as severe delay.

Validation of SGS II

A paediatric neurologist, two paediatric residents and three primary school teachers assessed the tool for face validation and content validation. The assessors examined the tool for its relevance to domains of interest, appropriateness of language, clarity of instructions and likelihood of cultural bias. The 'fish formboard' item in the visual comprehension skill set was noted to have cultural bias as it contained shapes of sharks and whales which Nigerian children are not so familiar with. They noted the similarity of majority of the contents (e.g. building blocks, cup, spoon, hairbrush, ball, pictures, colour cards, *et cetra.*) to those most children were already exposed to at home or in the preschool centres.

The content validation was done by calculating the Content Validity Ratio (CVR)[14] for each item. The CVR measures between -1.0 and +1.0. The team rated each item under the various domains as either "essential," "useful but not essential," or "not essential". The total number of "essential" ratings was tallied for each item.

A formula:[14] $CVR = \frac{E - (N/2)}{(N/2)}$

Where E= number of team members who rated the item as essential N= total number of team members

The closer to 1.0 the CVR was, the more essential the item was considered to be. 60% of the items had CVR of 1.0, while 30% had CVR of 0.6-0.8, 5% had CVR of 0.3-0.5, 5% had CVR of 0.2,

A pilot study was conducted prior to commencement of this study. This pilot study involved 20 pupils found in the preschool unit of a primary school in Zaria. At the end, the 'fish formboard' from the visual skill domain was difficult to comprehend by the children even after 30 minutes. All the children who attempted it completed the next item to the 'fish formboard' successfully, hence it was removed. Other aspects of the tool were easy to comprehend and were carried out by the pupils. It took between 15-20 minutes to administer the tool on each child.

Statistical Analysis

Data were cleaned; coded and analyzed using the statistical software SPSS version 20.0.0.Means and standard deviation were calculated for continuous variables while ratios and proportions were calculated for categorical variables. The test of association between categorical variables was done using Pearson Chi-square test or Fisher's exact test where applicable. Odds ratio (OR) with 95% confidence interval (CI) were also given. A p-value of less than 0.05 was considered statistically significant in comparative analyses.

Results

Sociodemographic Characteristics of Study Population

The age range of the study population was 6-59months, with a mean age of 32.6±15.9 months. There were 227 males and 188 females, with a male to female ratio of 1.2:1. Children from Hausa ethnic group were 180 (43.4%), Yoruba 77 (18.6%, Ibo 30 (7.2%), while the minor ethnic groups (Jabba, Idoma, Igala, Kutyep, Kagoma *etc)* made up 30.8%. Two hundred and eighteen (52.5%) were from the upper socioeconomic class. A little over half (54.7%) of the mothers had tertiary education. Other sociodemographic characteristics are as shown in Table I.

Prevalence of developmental delay

Figure 1 shows that a total of 147 (35.4%) had developmental delay consisting 15.2%, 9.9% and 10.3% in 1, 2, and 3 or more domains.

Table : Sociodemographic characteristics of study population

	Characteristics	Frequency	%
Age	6-11	63	15.2
	12-23	50	12.1
	24-35	94	22.7
	36-47	110	26.5
	48-59	98	23.6
Sex	Male	227	54.7
	Female	188	45.3
Ethnicity	Hausa	180	43.4
	Yoruba	77	18.6
	Ibo	30	7.2
	Others	128	30.8
Socioeconomic class	Lower/middle	197	47.5
	Upper	218	52.5
Mother's educational level	Secondary and below	188	45.3
	Tertiary	227	54.7
Child Birth Order	First	96	23.1
	Others	319	76.9
Household size	≤6	310	74.7
	>6	105	25.3

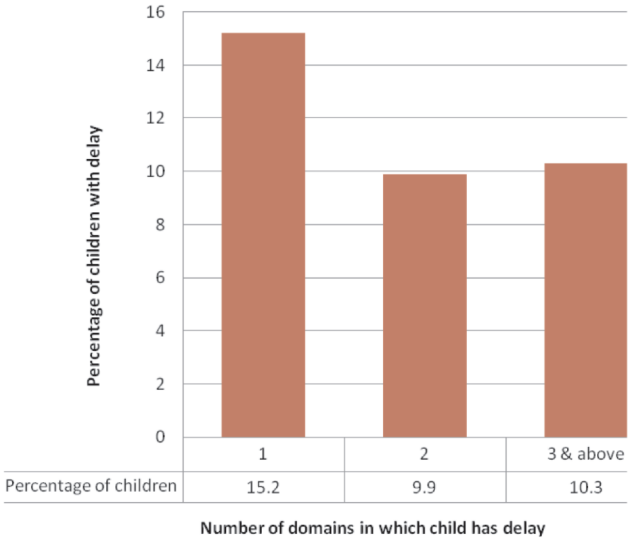

Figure 1: Overall prevalence of developmental delay

Table 2 shows that no child had delay in the active postural domain. The manipulative domain had the highest prevalence of delay with 69(16.6%) having mild-moderate delay and 38(9.2%) children had severe delay in that domain. Forty-eight (11.6%) had mild-moderate delay and 23 (5.5%) had severe delay in the visual domain.

Table 2: Prevalence of developmental delay per domain

Developmental domain	Developmental Quotient Normal (DQ≥85%)	Mild-moderate delay (DQ=71%- 84%)	Severe delay (DQ≤70%)
Active postural	415 (100.0)	0 (0.0)	0 (0.0)
Passive postural	414(99.7)	0(0.0)	1(0.3)
Locomotive	405(99.6)	9(2.2)	1(0.2)
Manipulative	308(74.2)	69(16.6)	38(9.2)
Visual	344(82.9)	48(11.6)	23(5.5)
Hearing and language	389(93.7)	20(4.8)	6(1.5)
Speech and language	398(95.9)	10(2.4)	7(1.7)
Interactive social	391(94.2)	18(4.3)	6(1.5)
Self-care social	397(95.7)	12(2.9)	6(1.5)
Cognitive	359(86.5)	45(10.8)	11(2.7)

Table 3 shows that child birth order had significant association with visual domain (p= .014) and interactive social domain (p= .014) with 26.0% and 11.5% of first born children having delay in visual and interactive social domains respectively. Household size was associated with delay in visual (p= .005) and cognitive (p= .024) domains while the mothers' educational level had significant association with delay in locomotive domain (p=.026), manipulative domain (p=.005), visual (p= .005), speech and language (p=.032), self-care social (p= .019) and cognitive domain (p= .028).

Table 4 shows that children whose mothers had secondary level of education and below had increased odds of delay in manipulative domain (OR=1.89; 95% CI 1.21-2.95), visual domain (OR=2.11; 95% CI 1.25-3.55), speech and language (OR=3.03; 95% CI 1.05-8.75), interactive social (OR= 3.05; 95% CI 1.32-7.04), cognitive (OR=1.89; 95% CI 1.07-3.35) and locomotive (OR=5.00; 95% CI=1.04-23.84). The table also shows that children of first birth order and those living in households with more than 6 members had twice the odds of delay in visual domain, (OR=2.09; 95% CI=1.20-3.63) and (OR=2.09; 95% CI= 1.22-3.60) respectively

Table 3: Association between developmental delay and sociodemographic characteristics

Characteristics(N)	Developmental delay per domain, n(%) Locomotive	Manipulative	Visual	Hearing and language	Speech and language	Interactive social	Self-care social	Cognitive
Gender								
Male (227)	5(2.7)	55(24.2)	43(18.9)	16(7.0)	9(4.0)	13(5.7)	12(5.3)	32(14.1)
Female (185)	5(2.2)	52(27.7)	28(14.9)	10(5.3)	8(4.3)	11(5.9)	6(3.2)	24(12.8)
p-value	.763	.426	.276	.469	.882	.957	.297	.693
Child birth order								
1st (96)	4(4.2)	28(29.2)	25(26.0)	7(7.3)	5(5.2)	11(11.5)	5(5.2)	16(16.7)
Others (319)	4(2.0)	79 (24.8)	46(14.4)	19(6.0)	12(3.8)	13(4.1)	13(4.1)	40(12.5)
p-value	.430	.387	.008*	.636	.531	.007*	.636	.299
Household size								
<6 (310)	6(1.9)	73(23.5)	44(14.2)	17(5.5)	13(4.2)	17(5.5)	12(3.9)	35(11.3)
>6 (105)	4(3.8)	34(32.4)	27(25.7)	9(8.6)	4(3.8)	7(6.7)	6(5.7)	21(20.0)
p-value	.279	0.074	.005*	.259	.864	.654	.423	.024*
Mother's education								
Secondary & below (188)	8(4.3)	61(32.4)	43(22.9)	15(8.0)	12(6.4)	15(8.0)	13(6.9)	33(17.6)
Tertiary (227)	2(0.9)	46(20.3)	28(12.3)	11(4.8)	5(2.2)	9(4.0)	5(2.2)	23(10.1)
p-value	.026*	.005*	.005*	.190	.032*	.081	.019*	.028*
Socioeconomic class								
Low/middle (197)	5(2.5)	51(25.9)	32(16.2)	13(6.6)	6(3.0)	12(6.1)	6(3.0)	28(14.2)
Upper (218)	5(2.3)	56(25.7)	39(17.9)	13(6.0)	11(5.0)	12(5.5)	12(5.5)	28(12.8)
p-value	.871	.963	.657	.790	.305	.798	.219	.684

*=p value <0.05

Table 4: Sociodemographic risk factors of developmental delay

	Locomotive	Manipulative	Visual	Speech & language	Interactive social	Self-care social	Cognitive
Child birth order							
1st	2.27(.627-8.21)	1.25(.75-2.08)	2.09 (1.20-3.63)*	1.41(.483-4.10)	3.05(1.32-7.04)*	1.29(.45-3.72)	1.39(.742-2.62)
Others	1	1	1	1	1	1	1
Household size							
<6	1	1	1	1	1	1	1
>6	2.01(.555-7.25)	1.56(.95-2.53)	2.09 (1.22-3.60)*	.905(.288-2.84)	1.51(.550-4.12)	1.55(.55-4.12)	1.96 (1.09-3.56)*
Mother's education							
Secondary & below	5.0(1.04-23.84)*	1.89(1.21-2.95)*	2.11(1.25-3.55)*	3.03(1.05-8.75)*	3.05 (1.32-7.04)*	3.30(1.15-9.43)*	1.89 (1.07-3.35)*
Tertiary	1	1	1	1	1	1	1

Discussion

The prevalence of developmental delay in children in this study was 35.4%. A slightly higher prevalence rate of 44.6% was obtained among under-five children in a rural setting in Ghana.[15] Children in rural areas are less likely to be exposed to psychosocial stimulation while their counterparts in urban or semi-urban areas have more opportunities to psychosocial stimulation, thereby improving their developmental outcome.[9] This may account for the lower prevalence of developmental delay in the present study. The prevalence of developmental delay in our study was, however, higher than figures documented in other previous studies. [16, 17, 18]Although these studies [16, 17, 18] were in developed countries where children are more likely to be conversant with developmental assessment tools; we believe the variance may be in the method of assessment. While our study was based on a combination of direct assessment, parents' report and observation methods,[9] previous studies[17,18] used only parents' reports and ratings with the shortcomings of recall bias, inflation of scores or denial of disability.[9] Another possible reason for the higher prevalence of developmental delay in our study is that we examined a wide age range of children (6-59 months) across many developmental domains. Therefore there is a high likelihood of identifying more children with developmental delay across various developmental domains and stages of under-fives.

This study showed that children of higher birth order had significantly lesser occurrence of delay in visual and interactive social domains. This finding was not surprising as it has been observed that rise in family income over time, parental experience in child-upbringing and added experience of the older siblings tend to be beneficial to child development.[19,20] Gibbs *et al.*[21] similarly found that the presence of additional children increased the occurrence of sibling communication, thus improving development in speech and language. In contrast, however, we observed that developmental delay was significantly more prevalent in the visual and cognitive domains of children in large household sizes. This reflects the negative effect large household size can have on child development despite the positive influence of additional members postulated by other studies.[19,20,21]

In this study we observed that mother's educational level was significantly associated with child developmental outcomes in manipulative, visual, interactive social, self-care social, cognitive and locomotive domains. The lower the mother's educational level the higher the odds of developmental delay in these skill areas. Previous studies [22,23,24] have supported this finding that poor maternal education was a risk factor to poor child developmental outcomes. The more educated mothers are more likely to have higher income and more likely to provide high quality child care that promotes development.[24,25] Only a few studies[26,27,28] suggest that high maternal education leading to maternal employment has detrimental effect on child development as such mothers tend to work longer hours leading to reduced quality of time with the children or children starting preschools too early, thus lagging behind in certain skills.[27]

In contrast to previous studies[29,30,31] that have shown that children from impoverished backgrounds were at heightened risk for low development in neuro-cognitive skills with resultant poor academic readiness and achievement; we observed that there was no significant association between socioeconomic class and developmental delay in any of the domains. The reason for our finding could be that most of the children in this study were in preschool centers and would have been exposed to cognitively enriching materials and activities in their preschool centers compensating for any exposure lacking at home.

The findings in our study have implications for the promotion of child development. The study stresses the need for screening at different stages of development

before school entry. There is a need for the Ministry of Health, Ministry of Education, health institutions, schools and other stakeholders to strategize and coordinate the developmental screening for children and the identification of risk factors in the best interest of the child. These findings further strengthen the recommendation of World Health Organization on the need for early identification of children with disabilities.[32]

The strength of this study is that it assessed children across many domains and thus provides important information on them and the environmental factors interacting with them. It also used a tool which applies multiple methodologies to assess the domains thus giving a richer and more thorough developmental profile. The participants in this study also cut across different ethnic groups in the country, though its association with development was not considered. This study has examined developmental delay in North-West Nigeria. Despite the strengths, however, there are some limitations. First, although the face and content validity carried out in this study systematically assessed test content, construct and criterion validation of the tool would have given more scientific and statistical strength to the screening tool used. Secondly, the study is a cross-sectional study hence shares the weaknesses of cross-sectional study designs. Despite these limitations, this current study stimulates a need for developmental assessment of apparently healthy children and institution of appropriate intervention programs for those found to have developmental delay. It calls for further research in child development at national level.

Conclusion

Developmental delays are common among under-five children in Zaria. The manipulative domain was the most prevalent domain with delay while the locomotive domain was the least prevalent domain with delay. Child birth order, household size and mother's educational level were the sociodemographic factors associated with developmental delay in various domains of child development.

This study has highlighted the prevalence of developmental delay and associated sociodemographic risk factors among apparently healthy under-five Nigerian children in North-West Nigeria. We recommend that routine screening of children for developmental delay should be done at regular intervals-during infancy, toddlerhood, preschool period and just before school entry; for early identification of developmental challenges. Intervention programs must be developed and should equally target environmental interventions and not only health challenges.

Contribution Details:

First author conceived and designed the study, assessed the participants and supervised collection of other data, performed the analysis and interpretation of data and drafted the manuscript. Second author involved in designing the study, interpreted the data and critically reviewed the manuscript. Third author involved in designing the study and reviewed the manuscript critically. All the authors read and approved the final manuscript.

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References

1. Commonwealth of Virginia Policies and Procedures for Part C of IDEA – 2000.
2. Walker SP, Wachs TD, Gardner JM, *et al*. Inequality in early childhood: risk and protective factors for early child development. Lancet 2011; 378: 1325-1338.
3. Gottlieb G. Experiential canalization of behavioral development: theory. Dev Psychol 1991. 27: 4-13.
4. Shonkoff JP, Phillips DA. (Eds.). From Neurons to Neighborhoods: The Science of Early Childhood. Development Committee on Integrating the Science of Early Childhood Development. Washington DC, USA: National Academy Press.2000.
5. Committee on Children with Disabilities. Developmental surveillance and screening of infants and young children. Pediatrics 2001; 108:192–5.
6. Baker L, Serpell R, Sonnenschein S. Opportunities for literacy and learning in the homes of urban preschoolers. In: Morrow LM, ed. Family Literacy: Connections in Schools and Communities. Newark: DE: International Reading Association, 1995: 236–252.
7. Snow CE, Burns MS, Griffin P. Preventing reading difficulties in young children. Washington DC, USA: National Academy Press.1998.
8. Venetsanou F, Kambas A. Environmental factors affecting preschoolers' motor development. Early Child Educ J 2010; 37: 319-327.
9. Fernald LC, Kariger P, Engle P, Raikes A. Examining early child development in low-income countries: a toolkit for the assessment of children in the first five years of life. Washington DC, USA: The World Bank; 2009.
10. World Medical Association. World Medical Association Declaration of Helsinki. Ethical principles for medical research involving human subjects. Bull World Health Organ 2001; 79:373.
11. Olusanya O, Okpere E, Ezimokhai M. The importance of social class in voluntary fertility control in a developing country. W Afr J Med 1985; 4: 205-12.
12. Martin B, Sunandra L, Aukett A. Schedule of Growing Skills II. Berkshire, UK: Granada Learning Assessment, 1996.
13. Robert BK. Development and developmental disabilities.

In: Robert BK, (Ed). Manual of Clinical Problems in Paediatrics. UK: Lippincott Williams & Wilkins, 2000: 29
14. Lawshe CH. A quantitative approach to content validity. *Pers Psychol* 1975; 28:563-575.
15. Bello AI, Quartey JN, Appiah LA. Screening for developmental delay among children attending a rural community welfare clinic Ghana. BMC Paediatr 2013; 13: 1-7.
16. Simpson GA, Colpe L, Greenspan S. Measuring functional developmental delay in infants and young children: prevalence rates from the NHIS-D. Paediatr Perinat Epidemiol. 2003; 17: 68–80.
17. Rosenberg AS, Zhang D, Robinson C. Prevalence of developmental delays and participation in early child intervention services for young children. Pediatrics 2008; 121: e1503. doi:10:1542/peds 2007-1680.
18. Eapen V, Zoubeidi T, Yunis F, Gururaj AK, Sabri S, Ghubash R. Prevalence and psychosocial correlates of global developmental delay in 3-year-old children in United Arab Emirate. J Psychosom Res 2006; 61: 321-326.
19. Parish WL, Willis RJ. Daughters, education and family budgets. Taiwan experiences. J Hum Res 1993; 2: 863-898.
20. Behrman JR, Taubman P. Birth order, schooling, and earnings. J Labor Econ 1986; 4:121-145.
21. Gibbs ED, Teti DM, Bond LA. Infant–sibling communication: relationship to birth-order spacing and cognitive and linguistic development, Infant Behav Dev 1987; 10: 307–323.
22. Lapp D, Flood J, Roser N. Still standing: timeless strategies for teaching the language arts, in: Strickland DS, Morrow LM. (Eds). Beginning Reading and Writing. New York, Teachers College Press, 2000. 183–193.
23. Schady N. Parents' education, mothers' vocabulary, and cognitive development in early childhood: Longitudinal evidence from Ecuador. Am J Public2011; 101: 2299.
24. Wamani H, Tylleskär T, Åstrøm AN, Tumwine JK, Peterson S. Mothers' education but not fathers' education, household assets or land ownership is the best predictor of child health inequalities in rural Uganda. Int J Equity Health 2004; 3: 9-16.
25. Carneiro P, Meghir C, Parey M. Maternal education, home environments and the development of children and adolescents J Eur Econ Assoc 2011; 11: 123-160.
26. Goldberg WA, Prause J, Lucas-Thompson R, Himsel A. Maternal employment and children's achievement in context: a meta-analysis of four decades of research. Psychol Bull 2008; 134: 77-108.
27. Behrman JR, Rosenzweig MR. Does increasing women's schooling raise the schooling of the next generation? Am Econ Rev 2002; 92: 323-334.
28. Barrows KM, Fragoso AG, Oliveira AL, Cabral –Filho JE, Castro RM. Do environmental in?uences alter motor abilities acquisition? A comparison among children from day-care centers and private schools. Arq Neuro Psiquiatr, 2003; 61: 170–175.
29. Hoff E. The specificity of environmental influence: socioeconomic status affects early vocabulary via maternal speech. Child Dev 2003; 74: 1368-1378.
30. Noble KG, Tottenham N, Casey BJ. Neuroscience perspectives on disparities in school readiness and cognitive achievement. Future Child 2005; 15: 71-89.
31. Bradley RH, Corwyn RF. Socioeconomic status and child development. Annu Rev Psychol 2002; 53: 371-399
32. Committee on Children with Disabilities. Developmental surveillance and screening of infants and young children. Pediatrics 2001; 108:192–5.