

Comparing Growth and Development and Related Factors in 60-Month-Old Children in Urban and Suburban Kindergartens of Khorramabad, Iran in 2020

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Abstract

Background: Developmental disorders in children are classified into different domains and early recognition and treatment can significantly affect children's social and individual functioning.

Aim: This study aimed to compare growth, development, and related factors in 60-month-old children in urban and suburban kindergartens of Khorramabad, Iran in 2020.

Method: This descriptive study was conducted on 100 children aged 60-month-old in urban and marginal kindergartens in Khorramabad city of Iran in 2020. The tools were Ages and Stages Questionnaire (ASQ) and a demographic characteristics information form with census sampling. Children were evaluated for growth indices such as height, weight and head circumference. Data were analyzed by SPSS statistical software (version 21) and Epi-Info software and T-test, Man-Whitney and Kruskal Wallis tests.

Results: The type of kindergarten had a significant relationship with the total score of development ($P=0.012$) and the domains of gross motor ($P=0.007$) and personal-social ($P=0.004$). The mean prevalence of the developmental disorder was estimated 8.7% for urban and 16.1% for suburban children. Developmental delay is not related to gender, delivery type, maternal education, child's history of illness, and economic status of the family ($P>0.05$) and is related to nutrition and supplement use, the familial marriage of parents, father's addiction and history of developmental disorder ($P<0.05$).

Implications for Practice: Due to the high importance of timely diagnosis and intervention, it is necessary to diagnose and treat developmental disorders at a younger age. Correct planning of managers in the field of nursing can be effective in timely identification of children's developmental disorders and reducing their prevalence.

Keywords: Development, Growth, Preschool children, Suburban, Urban

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Introduction

Children represent the future of each society. The vitality and health of any society depend on the children's health (1). Therefore, it is essential to pay attention to children's growth and development and perform more researches in this regard (2). Developmental disorders in children are classified into different domains (i.e., major movements, fine movements, social skills, and speech-mental skills) that have a huge impact on a child's individual and social skills. Therefore, early recognition and treatment of developmental disorders is important (3). Growth is defined as changes in body size (4,5), progress in functional capacity and skills, and a qualitative change in a child's activities (6). When there is a delay in the development of age-related abilities and skills in a child, his/her developmental course is disrupted and the child develops a so-called developmental disorder (7).

A wide range of risk factors causes a delay in development. The results of studies have shown that living in suburban and urban is among the factors affecting physical development in children (8). In the study conducted by Ghorbanzadeh et al. (2019), the growth and development of children aged 4 to 24-month were assessed and a significant relationship was observed between gender and developmental delay (9). In the study performed by Karami et al. (2014) on one-year-old children in Khorramabad city of Iran, it was revealed that 7.9% of children had abnormal development (10). The Ages and Stages Questionnaire (ASQ) is an available tool for the identification of developmental disorders in children and is used to study disorders in one-year-old children in Iran (9).

Review of literature showed that physical development in 60-month children received less attention and, despite positive and appropriate effect of developmental screening on the diagnosis and treatment of disorders, preschool developmental screening is not performed in Iran (11). Therefore, the present study was conducted in collaboration with and at the request of the Welfare Organization in Lorestan Province of Iran to compare the growth and development in 60-month-old children in urban and suburban kindergarten of Khorramabad, Iran.

Methods

This descriptive cross-sectional study was conducted in Khorramabad, Iran from January to March 2020. Participants were all five-year-old children (n=100) who had inclusion criteria and were selected from 28 urban and 7 suburban kindergartens. Inclusion criteria were: children aged 60 months, parental satisfaction to participate in the study, and child's living with two parents. Exclusion criteria were: parents' unwillingness to participate in the study and clear congenital anomalies. The subjects were selected using the purposeful sampling method.

The plan for visiting the kindergartens was set by the researchers. At first, the statistics of all urban and suburban kindergarten were prepared with the cooperation of Welfare and the Referral program to the kindergartens. Sampling was carried out in 3 months, followed by the emergence and spread of the coronavirus, and followed by the closure of kindergartens. The method of continuation of sampling has changed and the researcher continued sampling after 5 days with the address of the families of the children in the coordination in 15 days from the last two decades of March by referring to children's homes. Then, by daily refer to child's kindergartens and homes, children were evaluated for weight, height and head circumference (children's weight, was measured with 100 grams accuracy and their height was measured with 1 mm accuracy). The balance of the scales was first ensured at the given location, and then the extra clothes of the child were removed from the body by the mother and then the child's weight was measured. Height was measured in such a way that the child stood next to the height meter placed at the bottom of the wall, and the heels of his feet, serine, upper back and post-series area were attached to the wall and heels, and the arms were hanging naturally next to the body. Also, to measure the child's head circumference, the distance from the back to the most prominent point on the forehead with a band meter was measured. However, due to the coronavirus outbreak, all measurements were carried out in accordance with hygienic guidelines. Then, the researcher obtained the consent of the parents and the questionnaire was given to the families. In case of insufficient literacy of parents to complete the questionnaire, it was completed by a family member who was literate and familiar with the child and otherwise, the questionnaire was completed with the cooperation of the questioner and the parents in kindergartens.

ASQ test showed developmental status of 60 month-old children in 21 different age groups (Every two months) and in five evolutionary domains (communication, gross motor, fine motor, problem solving and personal-social) are evaluated. For each age group, a total of 30 questions (six questions for each domain) have been designed and the highest designed score for each domain is 60. Questions in each area are arranged in order from easier activities to harder activities. The questions of each domain are assessed based on whether the child has or does not have the ability to perform activities related to each domain (11). There are three options for each question. "Yes" for when the child is able to do it, "No" is intended when the child is not capable at all and "sometimes" is considered when the child is capable of doing this activity sometimes. After completing the questionnaires by the family, the researcher compares the obtained scores with the cut-off points. The score of 10 is given to the answers of yes, 5 to the answers of sometimes and zero to the answers of still not. The total score for each of the five areas is compared to the standard score, and if the child's score is below the standard level, the child needs a thorough review in the same area. At the end of each questionnaire, a section called "General Cases" is considered for obtaining general opinions of parents. Then, the scores related to each evolutionary domain are summed up and the final score in each domain is compared with the cut-off points of the ASQ guidelines. The child is currently fine if the scores in each developmental domain from the declared cut-off point are equal to or greater than "a deviation below the average". The child will be referred for careful examination and evaluation if the points are equal to or less than "two deviations below the average". If the scores are placed between the numbers "one deviation below the average" and "two deviations below the average", the parents perform the exercises for the child's growth and prosperity at the relevant ages and then test the child again after two weeks. If it is not equal to or greater than "a deviation below the average," the child will be referred for a more detailed assessment (12). In the study of Sajedi et al., Cronbach's alpha coefficient for 4-60 months of age children was 0.79 and construct validity of the questionnaires was confirmed by factor analysis method (13). Demographic Information Questionnaire is a researcher-made questionnaire. Its content and reliability were extracted according to the nature of the study and the studied components and reviewing the articles related to the studies published between 2015 and 2020. Its reliability was confirmed with qualitative method by 10 faculty members of Khorramabad School of Nursing and Midwifery. The questionnaire included demographic information such as number of children, birth rank, type of nutrition, consumption of supplements, parental smokers, economic level of family, education, family relationship of parents and history of evolutionary delay in other children in the family.

Data were analyzed by SPSS statistical software (version 21) , ratios and indices and appropriate dispersion. The normality of data was evaluated by, Kolmogorov - smirnov test and graphic organizers of pp - plot and QQ plot; if data were normal , Independent t - test and otherwise Mann - Whitney test were used. Chi - square test was used to compare the qualitative variables between two group. Finally, Multiple Linear Regression was used to improve the connection of the type of kindergarten with the overall score of evolution by adjusting other variables, mutiple linear regression was used and the results were reported at a significant level of 0.05. In fact, if the total score of development or the scores in different areas of development in terms of the studied variables (gender, mother's education, father's addiction, etc.) were less than 0.05, it means that there is a developmental disorder in those areas in children.

Results

In this study, a total of 100 children aged 60 month-old (31 children in suburban kindergartens and 69 children in urban kindergartens) were evaluated in terms of development by ASQ questionnaire. In terms of gender, 37 children (53.6%) in urban kindergartens and 17 (54.8%) in suburban kindergartens were boys and the rest were girls. Table 1 showed the type of delivery, maternal education, supplementation, family ratio, history of developmental delay, birth rank, economic level, history of disease, father addiction, and type of nutrition. According to Chi-square test and $P < 0.05$, the two groups were homogeneous in areas such as gender, type of delivery, supplement use, family relationship of parents, history of developmental delay in other children, birth rank, economic level, history of illness, father's addiction, type of nutrition and mode of birth, unlike the area of mother's education level. The two groups were significantly different in terms of mother's education level

Table 1. 60-month-old children's consensus table in Khorramabad city based on kindergarten type and underlying variables

Variable		Urban		Suburban		Test Statistic	P-Value*
		Number	Percent	Number	Percent		
Gender	Male	37	53.6	17	54.8	0.013	0.99
	Female	32	46.4	14	45.3		
Type of delivery	NVD	44	63.8	20	64.5	0.005	0.99
	C/S	25	36.2	11	35.5		
Mother's education	Highschool	26	37.7	22	71	12.64	0.005
	Diploma	19	27.5	6	19.4		
	University	24	34.8	3	9.7		
Consumption of multivitamins	Has	39	56.5	19	61.3	0.2	0.872
	Doesn't Have	30	43.5	12	38.7		
Parental relationship	Attributed	39	56	17	54.8	0.025	0.87
	Not attributed	30	44	14	45.2		
History of developmental delay in other children	Has	9	13	4	12.9	0	0.99
	Doesn't Have	60	87	27	87.1		
Birth rank	1-2	52	75.5	17	54.9	1.44	0.486
	3-5	17	24.5	14	45.2		
Economic level	Rich	15	21.7	2	6.5	4.97	0.083
	Medium	35	50.7	15	48.4		
	Weak	19	27.5	14	45.2		
disease background	Has	5	7.2	4	12.9	0.453	0.361
	Doesn't Have	64	92.8	27	87.1		
Addiction father	Has	23	33.7	13	41.9	0.687	0.50
	Doesn't Have	46	66.7	18	58.1		
Type of nutrition	Breast milk	39	56.5	15	48.4	1.01	0.603
	milk powder	30	43.5	11	35.5		
	Both	17	24.6	5	16.1		
How To Be Born	Late Preterm	6	8.7	3	9.7	0.62	0.73
	Preterm	58	84.1	27	87.1		
	Term	5	7.2	1	3.2		
		Mean±SD		Mean±SD		Test Statistic	P-Value**
Weight	-	64.1±18		31.17±24.1		T=2.07	0.041
Height	-	122.6 ±5.68		125.5±41.85		T=2.42	0.017
Head circumference	-	53.1±65.04		53.0±69.84		t=0.19	0.0847

*Chi square **Independent t-test

(P=0.003). Also, Independent t-test showed that there was a significant difference between the mean weight and height of the two groups (P<0.015).

The obtained results showed that the prevalence of the developmental disorder was estimated at 8.7% for urban and 16.1% for suburban children and 11% of them had developmental disorders in total. In

order to compare the domains and the overall developmental score of the participants, Man-Whitney test indicated that there was no significant difference between urban and rural children in the problem solving (0.168) sub-area. But in the area of communication, urban kindergarten children were more successful than marginal ones ($0.05 < P < 0.1$). The prevalence of developmental disorder in suburban kindergartens was higher than urban children ($P < 0.05$) (Table 2). There was a significant relationship between the use of supplements and developmental disorder in urban children ($P = 0.048$), as opposed to children in suburban areas ($P = 0.646$). On the other hand, the use of supplements was effective in the sub-domain of communication in the urban kindergartens ($P = 0.014$), as opposed to suburban kindergartens ($P = 0.984$).

Moreover, nonsignificant relationship was observed between the type of nutrition and developmental disorders of children in the urban kindergartens ($P = 0.056$), as opposed to the suburban kindergartens ($P = 0.223$). There was a significant relationship between other variables, such as the birth rank of the child and the range of fine movements ($P = 0.042$ vs. $P = 0.483$), the familial suburban of parents and the social-personal domain ($P = 0.039$ vs. $P = 0.953$), history of the developmental disorder in the child or previous children of the family and the field of communication ($P = 0.045$ vs. $P = 0.842$), father's addiction and the field of problem-solving ($P = 0.048$ vs. $P = 0.622$) in urban versus suburban kindergartens, respectively.

However, there was no significant relationship between the other studied variables for example Gender ($P = 0.99$), Type of delivery ($P = 0.99$), Consumption of multivitamins ($P = 0.872$), Parental relationship ($P = 0.87$), History of developmental delay in other children ($P = 0.99$), Birth rank ($P = 0.486$), Economic level ($P = 0.083$), disease background ($P = 0.361$), Addiction father ($P = 0.50$), Type of nutrition ($P = 0.603$), and the type and location of kindergartens ($P > 0.05$). Finally, to investigate the relationship between the type of kindergarten and total score of evolution, the results of multiple linear regression showed that by adjustment of other variables, there was no relationship between the type of kindergarten and total score of evolution ($P = 0.57$). In order to evaluate the appropriateness of the model, the value of $R^2 = 0.46$ showed that 46% of the variance of the dependent variable was correctly explained. Also, the regression model showed that assuming that other variables of infant status at birth were related to the total developmental score, so that the average total developmental score of mature infants was 19.62 points higher than premature infants, which was statistically significant ($p < 0.001$). There was no significant relationship between other variables and developmental score ($p > 0.05$). For this regression model, the value of Adjusted R^2 was 0.46, indicating this model explains 46% of the changes (Table 3).

Table 2. Comparison of developmental scores of 60-month-old children in urban and suburban kindergartens

Scopes of development	Kind of kindergarten	Standard deviation \pm Mean	P-Value*
Communication	Marginal	53.06 \pm 8.02	0.078
	Urban	55.51 \pm 6.76	
Gross motor	Marginal	48.71 \pm 11.54	0.007
	Urban	50.07 \pm 10.27	
fine motor	Marginal	51.13 \pm 13.64	0.06
	Urban	51.01 \pm 12.41	
Problem Solving	Marginal	50.65 \pm 12.76	0.168
	Urban	53.33 \pm 9.38	
Personal-Social	Marginal	52.42 \pm 9.90	0.004
	Urban	56.16 \pm 7.18	
Total Development Score	Marginal	51.19 \pm 10.55	0.012
	Urban	53.21 \pm 8.23	

*Independent t-test

Table 3. Modeling the relationship between nursery type and total development score by modifying other variables using multiple linear regression

Variables	Coefficient β	Standard Deviation	Standardized β Coefficient	T	P-Value
Kindergarten	0.974	1.708	0.050	0.570	0.57
Wight	0.642	0.609	0.111	1.056	0.294
Height	0.169	0.119	0.123	1.413	0.162
Round The Head	0.008	0.762	0.001	0.011	0.991
Parental Addiction	0.339	1.467	-0.018	-0.231	0.818
Economic Level	-0.173	1.214	-0.13	-0.143	0.887
Supplementation	2.110	1.454	0.116	1.451	0.151
Nutrition	0.545	0.924	-0.045	-0.590	0.557
Relative	2.482	1.431	0.137	1.735	0.086
History Of Developmental Delay in Other Children	2.547	2.311	0.096	1.102	0.273
Birth Rank	-1.439	0.852	-0.149	-1.689	0.095
Disease History	-1.336	2.443	-0.043	-0.547	0.586
Mothers' education	0.309	0.854	0.037	0.362	0.718
Type Of Delivery	-1.367	1.470	-0.073	-0.929	0.355
Gender	-2.176	1.644	-0.121	-1.323	0.189
Status Of Birth	19.62	2.990	0.594	6.546	<0.001

Discussion

According to the results of the present study, the prevalence of the developmental disorder was estimated at 8.7% for urban and 16.1% for suburban children. These results were consistent with those obtained in the cross-sectional study performed by Shaahmadi et al., in which the prevalence of developmental disorder was obtained at 8.3% (12). In addition, the prevalence of developmental disorders was reported to be 5-10% in the study conducted by Limbos et al. (13). According to various studies, socio-economic conditions had a direct association with the risk of developmental disorders in children (14). Therefore, based on the results obtained in the present study, it can be concluded that the child's living conditions and environment are effective in the child's growth and development. Some program such as the developmental stimulation is effective in the receptive gross motor development (15).

In the present study, the highest and lowest prevalence of developmental disorders was in the domain of problem-solving (13%) and personal-social domain and large movements (9%), respectively. This result was in line with the results of the study by Ghorbanzadeh and colleagues that reported the highest and lowest prevalence of developmental disorders in the domains of personal-social (4.7%) and major movements (0.65%), respectively (9). In the present study, a significant relationship was observed between the use of supplements and developmental disorder which was in line with the study conducted by Jantan et al. , indicating that children's nutritional deficiency exposes them to a variety of infections and nutritional deficiencies and disrupts children's development (16).

It is worth noting that in the present study, some developmental sub-domains were affected by some factors (Table 3). The type of kindergarten, nutritional status, familial marriage of parents, father's addiction, and history of developmental disorders in other children in the family are among the factors affecting the incidence of developmental disorders. Therefore, regarding the importance of early detection of developmental disorders or timely intervention, developmental disorders must be diagnosed and treated at an early age. Paying attention to food intake in children can be an important factor to control developmental problems. The over- or insufficient consumption of food raises the probability of parents' unawareness about the standards of food serving for children (13).

So far, many studies have been done on the evolution of children of early age, but the present study explored the evolutionary situation of children aged 60 months and identified the factors influencing their evolution as well as providing a suitable vision for better management of these children. The limitations of the present study was the outbreak of the corona disease and the quarantine conditions, as well as reducing the willingness of some parents to cooperate .

Implications for practice

Since children's screening and diagnosis of developmental problems are among nursing practices, the results of this study can be used for educating nurses on the correct diagnosis of developmental disorders. Moreover, due to the observed significance of familial issues on the growth and development of the children in this study, it is possible to minimize the effects of these issues on children's growth and development by holding educational classes for mothers.

Based on the results obtained of the present study, nutritional status, familial marriage of parents, father's addiction, and history of developmental disorders in other children in the family are among the factors that affect the incidence of developmental disorder. Therefore, it is suggested that the child health care authorities take a step to reduce the incidence of developmental disorders and developmental needs by applying regular and accurate programmes as well as allocating sufficient funds to meet the needs and nutritional requirements of all children.

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Conflicts of interest

The authors declared no conflict of interest.

References

1. Mengesha DK, Haile DM. Prevalence and Determinants of Under-Nutrition Among Under-Five Children in Afar Region, Ethiopia: Evidence From 2016 Ethiopian Demographic and Health Survey. *Research Square*; 2022.
2. Rozmiarek M, Nowacki K, Malchrowicz-Moško E, Dacko-Pikiewicz Z. Eco-Initiatives in Municipal Cultural Institutions as Examples of Activities for Sustainable Development: A Case Study of Poznan. *Sustainability*. 2022;14(2):682.
3. Kvestad I, Taneja S, Kumar T, Bhandari N, Strand TA, Hysing M. The assessment of developmental status using the Ages and Stages questionnaire-3 in nutritional research in north Indian young children. *Nutrition journal*. 2013;12(1):1-11.
4. Chaudhari S, Deo B. Neurodevelopmental assessment in the first year with emphasis on evolution of tone. *Indian pediatrics*. 2006;43(6):527.
5. Zemel BS. Body composition during growth and development. *Human growth and development*. 2022:517-45.
6. Rezaeian A, Niknejad Jalali A, Mazlom S. An investigation of the effect of implementation of evidence-based care package on the gross motor development of the foster care infants. *Evidence Based Care*. 2013;3(3):69-80.
7. Burg FD, Gershon AA, Ingelfinger JR, Polin RA. *Current pediatric therapy*. Ames, IA; Philadelphia: Saunders Elsevier; 2006.
8. Smith LC, Ruel MT, Ndiaye A. Why is child malnutrition lower in urban than in rural areas? Evidence from 36 developing countries. *World development*. 2005;33(8):1285-305.
9. Ghorbanzadeh M, Nasimi F. Survey of growth and development in children 4 to 24 months covered by health centers in Jahrom based on age-stage Questionnaire. *Journal of Pediatric Nursing*. 2018;5(1):61-8.
10. Karami K, Abbasi L, Moridi F, Falah F, Bayat Z, Pourvakhshoori N. Evaluation criteria and factors associated with the development of one year old children in Khorramabad. *Journal of Pediatric Nursing*. 2015;1(3):57-64.
11. Kohansal Z, Motamed N, Najafpour Boushehri S, Ravanipour M. The Relationship between the Awareness and Performance of Parents Regarding Food Security with Anthropometric Indices among School-age Children in Bushehr, Iran, during 2017. *Evidence Based Care*. 2019;8(4):75-80.
12. Shaahmadi F, Khushemehri G, Arefi Z, Karimyan A, Heidari F. Developmental delay and its effective factors in children aged 4 to 12 months. *International Journal of Pediatrics*. 2015;3(1.1):396-402.

13. Sajedi F, Vameghi R, Mojembari AK, Habibollahi A, Lornejad H, Delavar B. Standardization and validation of the ASQ developmental disorders screening tool in children of Tehran city. *Tehran University Medical Journal*. 2012;70(7). (In Persian).
14. Xu X, Zhang L. How does childhood socio-economic environment affect the health of middle-aged and elderly people in China? A new perspective with four dimensions of health. *Journal of Public Health*. 2022.
15. Ghayebie E, Rezaeian A. Effect of developmental stimulation program on the developmental measures of toddlers. *Evidence Based Care*. 2018;8(1):7-16.
16. Jonathan B, De Agostini M, Forhan A, Alfaiate T, Brreastfeeding Duration and cognitive Development at 2 and 3 Years of Age in the EDEN Mother-child Cohort. *The journal of Pediatrics*. 2013;163(1):36-42.