

Involving Mothers in Child Development Assessment in a Community-based Participatory Study Using Ages and Stages Questionnaires

Abstract

Background: Child-friendly environment project (MAZDAK) is a community-based project for monitoring the development of children in Iran that was implemented as a pilot study in one of the neighborhoods of Tehran (Eyvanak-e Gharb). This study attempted to engage mothers in monitoring of their children's development and assesses the status of children's development by a community-based participatory approach using the ages and stages questionnaires (ASQ). **Methods:** This study was a community-based participatory research. Two hundred households residing in Eyvanak-e Gharb with children under 5-year-old were selected as a convenient sample and completed the ASQ. Descriptive measures were used to describe the overall status of children, in each domain. Furthermore, we compared the current sample with other populations, using independent *t*-test. **Results:** This study engaged mothers, trained volunteers from the community, and some local institutions in screening and monitoring children development and addressing any poor developmental growth. The mean scores of the different domains (communication, gross motor, fine motor, problem solving, and social-personal) in sampled children in MAZDAK project were higher than corresponding mean scores of the children in a project conducted in Tehran in 2006. **Conclusions:** Involving mothers and community in monitoring children development based on ASQ was an effective strategy to monitor and foster children development.

Keywords: *Ages and stages questionnaires, community-based participatory research, early child development, women health volunteers*

Introduction

Living conditions during infancy and early childhood have a significant impact on further future development of children. Childhood is a crucial stage of development. There are golden opportunities in which neural network achieves its ultimate function based on environmental stimuli in this period of lifespan, first 5–6 years of life, especially the 1st year of life.^[1,2]

Health promotion practitioners seek to identify children with abnormal development using a proper screening program as early as possible in their lifespan, so they can reduce or improve the problems by timely interventions.

As the early months and years of life are an exceptional opportunity to learn essential skills and 80% of the brain's capacity is formed before the age of three, early childhood care and early training are

powerful tools to foster empowerment and overcome children's disabilities.^[3,4]

Until recent decades, most of the therapies for children with poor developmental outcome focused on the clinical aspects, by referring children to health centers, psychiatrists, occupational therapists, and speech therapist, audiometrists. However, recently, new approaches emphasize on the greater participation of parents in early diagnosis, therapeutic intervention, and rehabilitation of them. Social determinants of health (SDH) that affects the development of children consist of living conditions (physical or socioeconomic conditions), parenting skills, relationships within the family and community, social supports, and related interventions, especially in social issues, and based on local capacities.^[5]

Since in the early ages of life, children are mostly in contact with their parents, parents

Payam Roshanfekr,
Safoora
Gharibzadeh^{1,2},
Leila
Mohammadinia³,
Firoozeh Sajedi⁴,
Elham Habibi⁴,
Hossein
Malekafzali⁵

Social Determinants of Health Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, ¹Department of Epidemiology and Biostatistics, Pasteur Institute of Iran, Tehran, Iran, ²Research Centre for Emerging and Reemerging Infectious Disease, Pasteur Institute of Iran, Tehran, Iran, ³Department of Disaster Public Health, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran, ⁴Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran, ⁵Social Determinants of Health Research Center, Islamic Azad University, Tehran Medical Branch, Tehran, Iran

Address for correspondence:

Dr. Hossein Malekafzali,
Social Determinants of Health
Research Center, Islamic
Azad University, Tehran
Medical Branch, Tehran, Iran.
E-mail: malek179@gmail.com

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are in the best position to detect the developmental problems of their children. Different studies showed that parents' concerns about their child's development as a benchmark has a sensitivity and specificity of 80% and 94%, respectively. Although there is a relationship between parents' knowledge about the development of children and their age, income, and education levels, Glascoe showed that there is no significant relationship between demographic characteristics and sensitivity of parents in the primary diagnosis of developmental disorders of children.^[6] Findings recommended that families and parents should be involved in follow-up and screening of their children's developmental progress.^[7-9]

In recent decades in Iran, all-round development of children has been paid attention among academics; and in the health policy agenda, formation of the secretariat of all-round growth and development of children and National Document of the Growth and Development of Early Childhood is evidentiary to this increasing concern. Moreover, early child development (ECD) has been noted in different children care programs by Iran Ministry of Health and Medical Education (MOHME). Child development assessment based on integrated package of health care is usually conducted in periodic examinations by nonphysician health team (in health homes by health workers, in health centers by family health expert, and in health post by midwives or nurses). If there is no problem for the child in this monitoring, other promotional measures are conducted.

Since 2012, according to the new agenda of the MOHME, the ages and stages questionnaires (ASQ) are completed in Iran for all children at the age 12 months (when referring to the health centers for MMR vaccination). The ASQ should be completed in 4 months of life of child and continued, as long as the developmental outcome is poor, for the high-risk infants (with a history of low birth weight, premature birth, high-risk obstetrics, hospitalization after birth, and so on).^[5]

Despite a long history of community-based health initiatives in Iran about child development, these initiatives are still limited and more evidence are required.^[10]

MAZDAK (child-friendly environment) is a community-based project for the development of children in Iran that is being implemented as a pilot study in one of the districts of Tehran (Eyvanak-e Gharb). The aim of this project is to engage parents and local community in different aspects of the all-round development of children using a community-based approach.^[11]

To investigate the effectiveness of this initiative, we compared the score of MAZDAK' children with national values and other countries over time.

Methods

This cross-sectional, community-based participatory research (or action research) attempted to involve the community for creating a favorable environment for comprehensive development of children through the mobilization and organization of local forces and organizations.

This study was a interventional community-based participatory study (our intervention was training of parents). This study was carried out in the population of Eyvanak area – a locale in West of Tehran. This area is 3022 km² and its population is 32,000 individuals. A group of women named REZAKAR, volunteers in local community, were selected based on their cooperation and their interests.^[12] They have been trained with several courses in their neighborhood health center. The courses were about safety, ECD, and nutrition and children oral health. They had at least diploma educational level and helped and trained mothers with under-five children in filling out the checklists and questionnaires. The ten volunteers covered 200 families and followed them by cell phone and telegram group. The role of volunteers was to control the scores, and if necessary, referring mothers and children to health centers for closer examination and complementary measures. Training classes were 2 h each week with the presence of the mothers and volunteers.

The inclusion criteria was being residence of Eyvanak-e Gharb district, having a child between 4 months to 5 years and giving consent to participate. The main organizations within the community that have been involved in the project includes Qods polyclinic (The Islamic Azad University, Tehran Medical Branch) and Qods Health Centre (affiliated to Iran University of Medical Sciences) and Saraye Mahalleh (affiliated to district municipality).

The ASQ questionnaire was used to monitor the children development; currently, its second edition considers 19 different age groups from 4 to 60 months with 30 questions to evaluate and screen child development in five domains of communication, gross motor, fine motor, personal-social, and problem-solving issues. This version has been translated and standardized among 11 thousand Iranian children in different cities, which also yielded the cutoff points.^[13] In 2015, two age groups of 2 and 9 months were added to the questionnaire in its third edition, based on this edition child development album that consisted of full ASQ was prepared and was given to the parents.

During the first 4 months of the plan, the volunteers and parents participated in the sessions and were trained on parenting, nutrition of children under 6 months and up to 2 years, children's oral health, promoting home safety, and children's play grounds. In addition, to facilitate access to information and answering the parents and volunteer questions, out of the classes' settings, a telegram group was created for information exchange between parents and volunteers and the research team. In the first 2 years after birth of child, parents with the aid of volunteers filled the questionnaire every 2 months, later on, in the 3rd year of life. The ASQ was filled every 4 months and in the 4th and 5th year after birth, we filled the questionnaire every 6 months. Due to the small sample size in groups of children older than 2 years, we just analyzed the data of under 2-year-old children.

Statistical analysis

There are five domains in ASQ: communication, gross motor, fine motor, problem-solving, and social-personal. At each age, we reported domains as mean \pm standard deviation (SD). We compared average of each domain with the average of USA, South Korea, Norway, and National values of IR Iran using Z-test.^[14] We also reported the percentage of children that their scores in each of the domains were less than mean of Tehranian children values minus one/two SD.

Using paired *t*-test we compared scores of first 4 months of the study with subsequent 4 months in children with 6, 8, and 10 months old at the beginning of the study.

Statistical significance level was assigned for $P < 0.05$. Statistical analysis was performed using Stata 14.0: Stata Corp. 2015. Stata Statistical Software: Release 14. College Station, TX, USA: Stata Corp LP.

Results

Table 1 shows the baseline characteristics of children and also comparisons of domains for different age groups (6–24 months) in children of MAZDAK project and similar study that was conducted in Tehran. The most significant difference is seen in the areas of gross motor and in age groups from 6 to 22 months. Differences are significant in fine motor in the ages of 8 and 10 months. A significant difference for children under 2 years was observed on problem-solving, communications, personal, and social issues at the age of 8 months. Only 9 out of 50 comparisons that compare MAZDAK sample with Tehran children study values were statistically significant.^[14]

Table 2 shows the number of children of the study that their score differs one or two SDs from the population mean, based on the national cutoff points.

According to normal distribution of scores, we expected that 17% of children have scores less than mean minus one SD and only 3% of them have scores less than mean minus two SDs. In this study, except in seven cases [identified with* in Table 2], we observed percentages $>3\%$. It may be because of small sample size in these age groups.

Table 3 shows comparison of values of different aspects of children’s development at ages 8, 12, 16, and 20 months in Iran, South Korea, America, and Sweden and in MAZDAK study. In all of the domains, MAZDAK sample had greater average compared to the average of South Korea, USA, Norway, and national average of IR Iran. For almost all of the domains except gross motor in 20 months old, these differences were statistically significant.

Table 4 shows comparison of the score mean of children aged 6, 8, and 10 months at baseline, before starting training with scores of these children 4 months after the start of the study. Despite an increase in scores in all areas, score change was not statistically significant in any of these areas.

Discussion

The aims of this study were early diagnosis of children developmental disorders and mobilizing the local community and engaging mothers in monitoring the children growth and development. Mothers were trained by local volunteers and in training classes held by the research team.

Table 1: Means of different domains of ASQ in <2 years old children (MAZDAK vs. Tehran)

Age group	Communication		Gross Motor		Fine Motor		Problem Solving		Social-Personal	
	MAZDAK	Tehran	MAZDAK	Tehran	MAZDAK	Tehran	MAZDAK	Tehran	MAZDAK	Tehran
6 (n=22)	55.90 \pm 5.90	51.18 \pm 7.21	53.86 \pm 6.34*	45.70 \pm 12.90	59.28 \pm 2.39	50.26 \pm 12.08	57.72 \pm 3.69	52.51 \pm 10.99	56.59 \pm 6.61	52.11 \pm 10.57
8 (n=30)	56.66 \pm 7.23*	55.83 \pm 6.77	53.88 \pm 11.34	53.33 \pm 8.56	58.66 \pm 4.53*	58.85 \pm 2.33	58.5 \pm 2.97*	58.33 \pm 3.16	56.5 \pm 5.74*	57.36 \pm 3.85
10 (n=28)	55.53 \pm 6.71	51.7 \pm 9.2	55.53 \pm 7.38*	57.37 \pm 6.12	58.75 \pm 2.92*	57.38 \pm 6.12	57.14 \pm 4.17	54.39 \pm 9.85	55.53 \pm 6.57	50.00 \pm 10.70
12 (n=36)	50.0 \pm 11.71	49.59 \pm 12.10	57.08 \pm 6.02	50.92 \pm 12.53	56.38 \pm 5.92	55.26 \pm 6.47	55.27 \pm 7.64	53.68 \pm 8.83	51.94 \pm 11.42	48.54 \pm 11.51
14 (n=30)	54.66 \pm 8.99	50.53 \pm 8.84	57.16 \pm 6.65*	57.70 \pm 4.80	56.50 \pm 6.03	49.74 \pm 12.02	57.00 \pm 4.84	52.11 \pm 10.69	57.00 \pm 4.84	52.89 \pm 7.68
16 (n=31)	50.32 \pm 10.40	47.94 \pm 12.13	59.03 \pm 2.72	54.09 \pm 14.78	55.51 \pm 7.45	50.88 \pm 13.51	55.48 \pm 8.50	50.11 \pm 11.05	53.22 \pm 8.22	51.85 \pm 10.32
18 (n=29)	53.44 \pm 10.78	49.58 \pm 11.61	58.62 \pm 3.50	58.87 \pm 3.34	56.89 \pm 5.24	50.71 \pm 7.78	59.79 \pm 2.55	50.09 \pm 9.39	58.79 \pm 2.55	55.14 \pm 5.67
20 (n=27)	55.53 \pm 6.71	45.69 \pm 15.91	55.53 \pm 7.73*	57.43 \pm 4.80	54.25 \pm 8.28	47.03 \pm 10.44	53.88 \pm 11.87	50.00 \pm 7.55	57.59 \pm 3.50	51.84 \pm 8.56
22 (n=16)	56.25 \pm 8.46	54.38 \pm 9.14	58.12 \pm 3.09*	54.84 \pm 7.24	54.38 \pm 7.93	47.72 \pm 8.37	55.31 \pm 5.61	51.25 \pm 8.03	56.56 \pm 5.69	54.22 \pm 6.97
24 (n=18)	57.77 \pm 6.23	53.03 \pm 12.24	56.94 \pm 5.18	55.61 \pm 6.34	54.16 \pm 6.47	48.64 \pm 9.21	53.61 \pm 8.54	49.70 \pm 8.83	56.11 \pm 6.54	53.64 \pm 8.86

*Domains that their differences from values of tehranian child were statistically significant

Table 2: Number and percentage of under development children at each age

Age/Domain	Minus one SD					Minus two SD					
	Communication	Gross Motor	Fine Motor	Problem Solving	Personal -Social	Communication	Gross Motor	Fine Motor	Problem Solving	Personal -Social	Communication
6 (n=22)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8 (n=30)	0%	2 (6.6)	0%	0%	0%	0%	1 (3.3)*	0%	0%	0%	0%
10 (n=28)	0%	1 (3.5)	0%	0%	0%	0%	0%	0%	0%	0%	0%
12 (n=36)	4 (11.1)	0%	1 (2.7)	4 (11.1)	3 (8.3)	0%	0%	0%	0%	0%	0%
14 (n=30)	2 (6.6)	0%	0%	1 (3.3)	0%	0%	0%	0%	0%	0%	0%
16 (n=31)	4 (12.9)	0%	1 (3.2)	2 (6.4)	2 (6.4)	0%	0%	0%	0%	1 (3.2)*	1 (3.2)*
18 (n=29)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20 (n=27)	3 (11.1)	0%	1 (3.7)	4 (14.8)	0%	1 (3.7)*	1 (3.7)*	0%	1 (3.7)*	1 (3.7)*	0%
22 (n=16)	1 (6.2)	0%	0%	0%	1 (6.2)	0%	0%	0%	0%	0%	0%
24 (n=18)	0%	1 (5.5)	0%	2 (11.1)	0%	0%	0%	0%	0%	0%	0%
Total (n=167)	14 (8.3)	4 (2.4)	3 (1.8)	13 (7.7)	6 (3.6)	1 (0.5)	2 (0.6)	0%	1 (0.5)	2 (0.6)	1 (0.5)

*Percentage >3% (expected value)

Involvement of mothers in development and evolution process of their children by participating in training sessions giving the development album to them and communication with volunteers contributed to increasing interest of mothers in promoting the development of their children, and their sensitivity to any lack or deficit in their child growth and developmental stage. Due to mothers' involvement in this process, mean growth and development of children in all areas have been higher than the national mean and even the mean of children development scores in developed countries such as America, Sweden, and so on.

Furthermore, this study showed that use of simple and understandable tool such as ASQ by mothers and supporting them through training, social network, and assisting them in scoring the scores through volunteers as well as referral the problematic cases to the centers is a convenient and inexpensive solution for screening and promoting children's development by mothers.

The results of Vameghi *et al.* study revealed that there are differences between the scores of Iranian children in this questionnaire and those of other countries in cutoff point,^[13] so that in areas including problem-solving and personal and social skills, they obtained higher scores in all areas except gross motor at the age of 8 months, fine motor at the age of 12 months, fine motor at age of 16 months, problem solving, and social skills at the age of 20 months. However, in gross motor at the age of 2 and 3 years, problem-solving at 4 and 5 years old and fine motor at 1, 2, 3, and 5 years old, this study showed lower scores for participants compared to their peers in America. Thus, developmental scores of Iranian children, especially in the case of gross and fine motor below the 1st year of life is higher than their American peers, but after this age, there is a significant reduction in the scores. The scores of other areas also decreased too at ages 4 and 5 years old, there is a decrease in the scores of problem-solving and personal-social skills as well. This could be due to poor physical stimulus at home such as educational material and resources, toys, and other physical stimuli including the type of parent-child

interaction, parental intelligence, and socioeconomic status of families. These findings are consistent with that of the previous studies in European and Asian countries.^[13]

Mothers in Tehran were investigated 10 years ago, and this difference may be due to the time difference, although these results were confirmed compared with the values of recent data in Iran in selected months.^[14]

Limitations

The project duration was short due to the limitation of project duration and we could not run the project as a longitudinal study. Some of the children were loss of follow-up due to moving out from Eyvanak-e Gharb residency. Furthermore, some of the mothers did not gave consent to participate in the study.

Conclusions

Involving mothers and community in monitoring child development based on ASQ was an effective strategy.

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Conflicts of interest

There are no conflicts of interest.

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Table 3: Comparing mean scores in each of the age groups with mean scores of I.R.Iran, Norway, S. Korea and U.S.A

Age	Communication				Gross motor				Fine motor				Problem-solving				Social-personal			
	USA	Norway	S.Korea	I.R.Iran	USA	Norway	S.Korea	I.R.Iran	USA	Norway	S.Korea	I.R.Iran	USA	Norway	S.Korea	I.R.Iran	USA	Norway	S.Korea	I.R.Iran
8	0.05	<0.01	<0.01	<0.01	0.93	0.07	<0.01	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	<0.01	<0.01	<0.01	<0.01
16	0.49	<0.01	<0.01	0.26	<0.01	<0.01	<0.01	<0.01	0.01	0.26	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04
20	<0.01	<0.01	<0.01	0.12	0.06	0.69	0.26	0.06	0.87	0.16	<0.01	<0.01	0.04	0.10	0.28	<0.01	<0.01	<0.01	<0.01	<0.01

Table 4: Comparing first 4 months with subsequent 4 months in children with 6, 8 and 10 months age

	First 4 months*	Second 4 months**	P
Communication	53.57±6.33	56.25±6.44	0.16
Gross motor	54.28±6.15	56.25±5.69	0.26
Fine motor	59.23±6.15	58.33±4.38	0.33
Problem solving	57.50±4.27	57.91±3.34	0.85
Social-personal	55.35±6.92	56.25±7.72	0.19

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