A nutritional Survey on Both Underweight and Stunting among Iranian Children between 6-24 months Old, Rafsanjan, Southeast Iran (2015)

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Abstract—**This study aimed at assessing the prevalence of stunting and underweight among children between 6 and 24 months old in southeastern area of Iran. This is a cross-sectional study. More than 470 families were randomly selected using a cluster sampling method. A checklist with 58 items was used for data collection process. Multiple regression model was also used to show the most associated factors. The prevalence of underweight and stunting among children aged 6-24 months was 2.9% (n=14) and 11% (n=54) respectively. Regression model showed that factors such as 'the level of food security in child's family', 'the economic status of the family', and 'children weight at birth', were significantly associated with both stunting and underweight. our findings were very similar to these pictures depicted for the other parts of the country showing that the prevalence of these health problems among Iranian children in this age group are lower than what is reported for many other developing countries.**

Index Terms—**stunting, underweight, children, nutrition, community-based, Iran, Rafsanjan**

I. INTRODUCTION

Children under two years old have always been a very important proportion of human communities in terms of communities' health. Health authorities measure the level of their community health using children under two years' old indices such as IMR (Infant Mortality Rate) which is very sensitive to socioeconomic situation of human communities [1].

Growth disorder caused by under nutrition is a serious risk factor for ill health and contributes substantially to the burden of disease in low- to middle-income countries [2]. Also it can cause another complication later in life, include impaired cognitive development, poorer educational achievement and human capital formation [3]. Children physical growth in particular the trend of weight and height gain should be monitored based on the children age, to show the normal growth [4].

However, it is difficult to judge about this type of growth among children without using a scale as standard. World Health Organization (WHO) introduced methods to make standard data (e.i. height and weight for age z scores) which are fully suitable for being used among all groups of children worldwide [5]-[6]. Normal differences between people make this method rational to be applied among every group of children around the world. Differences such as ethnicity, genotype [7] and environmental circumferences which differ between people living in different parts of the world, encouraged researchers to apply this method.

There are many studies conducted to explore determinants of Failure to Thrive (FTT) among children, particularly those with 6-24 months old (young children). Many similar related factors are reported by authors who worked on this health problem in different nations [8]-[11]. Factors such as mother's educational status, mother's job, birth weight, duration of breastfeeding and families income are in the list of these factors. Although there are some studies conducted to explore the prevalence and determinants of FTT in some other parts of the country [12]-[14], there is no such a research carried out in southeastern area of Iran. Furthermore, it is reported that the highest incidence of FTT occurs in children aged 9-24 months in both genders [15]. Therefore, our research team decided to measure this

health problem and its most correlated determinants among 6-24 months old children living in Rafsanjan, southeast Iran.

II. MATERIAL AND METHODS

This is a community-based cross-sectional research in which 475 families with a child between 6 and 24 months old were participated. The research approval was obtained from Rafsanjan University of Medical Sciences. The sample size was calculated based on the results we obtained from a pilot study conducted on twenty children. The single population proportion formula was then applied. About 5% and 10% of (8% for sample size calculation) children in the specific age group (6–24months) in the pilot were underweight and stunt, respectively. The confidence level of 95 % (a = 0.05) and d = 0.025 were considered. The largest sample size obtained from the calculation was considered based on the two indicators of underweight and stunting. A sample size of 456 was considered as the sample size for this study. Also about 5% non-response rate was added (n=20) to get the final sample size of 475.

Based on a cluster random sampling approach, the study area (Rafsanjan county, Southeast, Iran) was divided into more than 35 clusters with the minimum possible 'between variations'. Twelve clusters were randomly selected and based on their population, 475 families were invited proportionally. A written consent form was received from participants who were willing to attend after receiving details about the research and its objectives. The study checklist with 58 items was used in data collection process. Many items of the checklist were derived from a previously used questionnaire [16]. Checklist was divided into four sections including 1-demographic factors (20 items), 2- specific items about children physical growth (16 items), 3- health level of children (14 items) and 4- food security section (8 items). Study checklist was completed by a trained expert in face to face interview sessions with child's mother, and in few cases father or other relatives were interviewed. Mothers were invited to come in the health centers for an interview session in a quiet place. Mothers who were not convenient to come to the centre were interviewed in their homes.

Anthropometric measurements (weight and length) were taken for all children by an expert. The guide for measuring weight and height, were the standard anthropometric measurement procedures used as outlined introduced by the Food and Nutrition Technical Assistance (FANTA) project [17].

WHO method was applied to calculate both weight and height for age. Children with weight for age scores less than two standard deviation were known as failure to thrive (FTT) or underweight and scores of height for age less than two standard deviation were consider as stunting [18]. Data were analyzed in SPSS. Descriptive statistical methods were use to present participants based on their demographic characteristics and analytic methods (both parametric and nonparametric tests) were applied to compare stunting and underweight among different groups. Multiple regression model was also used to show the most associated factors with stunting and underweight among children.

III. RESULTS

Data for 475 families with one child between 6 to 24 months old were collected. Demographic characteristics of children are presented in Table I. As it is shown in the table, The number of families with one, two, three and four or more children was significantly different (p< 0.001). As table1 shows a big proportion of families had one or two children (81.7%). Only 14.2% and 4.1% of families under study had three and four or more children, respectively.

The level of mothers education among 45.9% was diploma or higher. Interestingly, this proportion among fathers was 23.8%, which was significantly smaller than that among mothers ($\chi 2 = 102.5$, df=4, p<0.001). Only about 5% of mothers reported having a job outside of their home. More than 59% of families reported low economic status and the remaining reported a desirable level of economic status. Based on the results obtained from items asking about food security of families under our study, more than half of families (52.2%) reported a secure situation. However, about 16% reported a moderately insecure situation and 32% reported a mild insecure situation in their families.

The results showed that a big majority of children were breastfed exclusively, in the first six months of their life (72.8%) and about one fourth (25.4%) were fed by breast milk along with powder milk or other complementary rather than powder milk. Only about 2% of children were not fed by breast milk in the first six months of their life. Among children between 6-24 months under our study, more than 79% of children were still feeding by breast milk and about 21% were not breast fed any more.

A big majority of mothers (92.6%) reported that they were attending to the child health education classes.

More than 11% (n=54) of children in our study had a height for age z score less than -2 and are known as stunt, although only 2.9% (n=14) of them had a weight for age z score less than -2 (i.e. About 3% of children were known as underweight). The results of t-tests showed that the mean birth weight of underweight children (2.8 ± 0.59 kg) was significantly lower than this mean among children with normal weight for their ages (3.2 ± 0.46 kg) (t=3, df= 473, p= 0.003).

However, the mean of birth height of underweight children was not significantly different from this mean among children with normal weight for their age.

Whereas, the results of t-tests showed that both birth weight (t= 3.6, df= 473, p=0.000) and birth height (t= 5.3, df= 473, p= 0.000) between stunt children and children with normal height for their age were significantly different. The mean birth weight and the mean birth height in stunt children were, respectively, 2.9 ± 0.56 kg and 46.4 ± 6.5 cm. These means among children with normal height for their age were 3.2 ± 0.45 kg and 48.6 ± 2.1 cm, respectively.

TABLE I.   DEMOGRAPHIC CHARACTERISTICS OF CHILDREN BETWEEN 6 AND 24 MONTHS OLD AND THEIR MOTHERS.

Demographic characteristics	N	%
Child's gender		
- Boy	252	53.1
- Girl	223	46.9
Child's age		
- 6-11	143	30.1
- 12-17	154	32.4
- 18-24	178	37.5
Mothers age		
- <= 20	16	3.4
- 21- 30	285	60.0
- >30	174	36.6
The number of family's children		
- One	194	41.6
- Two	187	40.1
- Three	66	14.2
- Four and more	19	4.1
Mother's education status		
- Primary school	90	18.9
- Primary school – high school	167	35.2
- Diploma and higher		
	218	45.9
Father's education status		
- Primary school and less	102	21.5
- Primary school – high school		
- Diploma and higher	259	54.5
	113	23.8
Working mother?		
- Yes	24	5.1
- No	451	94.9
Family's economic status		
- low	282	59.4
- moderate and high	192	40.6
Food security		
- high	248	52.2
- moderate	152	32.0
- low	75	15.8
Feeding status at the first six months of life		
- exclusive breastfeeding		
- breastfeeding + powder milk	346	72.8
- breastfeeding + other than powder milk	60	12.6
- no breastfeeding		
	61	12.8
	8	1.7
Is breastfeeding continued after the first six months of their life?		
- Yes	373	79.2
- No	98	20.8
Is mother attending to children health classes?		
- Yes		
- No	436	92.6
	35	7.4

The mean age for starting to have complementary food among children in our study was 5.8±0.7 months (min=1 and max=12 months). There was no correlation between this mean and neither height for age and nor weight for age of children.

Frequency distributions of the children based on the stunting, underweighting and some demographic characteristics are presented in Table II and Table III.

The regression model showed that height for age scores (stunting) of children were significantly associated with the scores of the level of food security in child's family, the economic status of the family, children height at birth, children weight at birth, and attending mothers in educational health programs.

There was no significant association between the other factors into the model (child's gender, child's age, diarrhea in the last 15 days, having snacks between meals, children age at the starting complementary nutrition, Feeding status at the first six months of children's life, mothers' working status, the level of mothers' education, the number of children in family and mothers' age), and height for age of children.

The regression model also showed that weight for age scores of children was significantly associated with the scores of the level of food security in child's family, the

economic status of the family, children weight at birth, having snacks between meals, attending mothers in educational health programs and children diarrhea in the last 15 days.

TABLE II. FREQUENCY DISTRIBUTION OF CHILDREN BASE ON STUNTING, UNDERWEIGHTING AND SOME DEMOGRAPHIC CHARACTERISTICS

Demographic characteristics	stunting				underweight			
	Yes		No		Yes		No	
	N	%	N	%	N	%	N	%
Feeding status at the first six months of life								
- exclusive breastfeeding	40	11.6	306	88.4	9	2.6	337	97.4
- breastfeeding + powder milk	9	15.0	51	85.0	3	5.0	57	95.0
- breastfeeding + other than powder milk	4	6.6	57	93.4	2	3.3	59	96.7
- no breastfeeding	1	12.5	7	87.5	0	0.0	8	100.0
Is breastfeeding continued after the first six months of their life?	41	11.0	332	89.0	11	2.9	362	97.1
- Yes	13	13.3	85	86.7	3	3.1	95	96.9
- No								
Having snacks between meals					*			
- Yes	5	14.3	30	85.7	1	2.9	34	97.1
- no	49	11.2	387	88.8	13	3.0	423	97.0
Diarrhea in the last 15 days?					*			
- Yes	14	11.6	107	88.4	2	1.7	119	98.3
- no	40	11.3	314	88.7	12	3.4	342	96.6
Attending mothers in educational health programs?	*				*			
- Yes	42	9.6	394	90.4	11	2.5	425	97.5
- no	12	34.3	23	65.7	3	8.6	32	93.4
children age at the starting complementary nutrition? (months)								
- < 6	9	10.3	78	89.7	2	2.3	85	97.7
- At 6	42	11.2	332	88.8	12	3.2	362	96.8
- > 6	2	20.0	8	80.0	0	0.0	10	100.0

TABLE III. FREQUENCY DISTRIBUTION OF THE CHILDREN BASE ON STUNTING, UNDERWEIGHTING AND SOME OTHER FACTORS.

Demographic characteristics	stunting				underweight			
	Yes		No		Yes		No	
	N %		N	%	N %		N	%
Feeding status at the first six months of life								
- exclusive breastfeeding	40	11.6	306	88.4	9	2.6	337	97.4
- breastfeeding + powder milk	9	15.0	51	85.0	3	5.0	57	95.0
- breastfeeding + other than powder milk	4	6.6	57	93.4	2	3.3	59	96.7
- no breastfeeding	1	12.5	7	87.5	0	0.0	8	100.0
Is breastfeeding continued after the first six months of their life?	41	11.0	332	89.0	11	2.9	362	97.1
- Yes	13	13.3	85	86.7	3	3.1	95	96.9
- No								
Having snacks between meals					*			
- Yes	5	14.3	30	85.7	1	2.9	34	97.1
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Diarrhea in the last 15 days?					*			
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- no	40	11.3	314	88.7	12	3.4	342	96.6
Attending mothers in educational health programs?	*				*			
- Yes								
- no	42	9.6	394	90.4	11	2.5	425	97.5
	12	34.3	23	65.7	3	8.6	32	93.4
children age at the starting complementary nutrition? (months)								
- < 6								
- At 6	9	10.3	78	89.7	2	2.3	85	97.7
- > 6	42	11.2	332	88.8	12	3.2	362	96.8
	2	20.0	8	80.0	0	0.0	10	100.0

*- The difference is significant (P<0.05)

IV. DISCUSSION

The data of this study were double checked, in other words the validity of the data collected from 475 randomly selected families, under our study is guaranteed. This community-based study is conducted among families whom 81.7% have one or two children and about 46% of mothers have an education level of diploma or higher. There was no illiterate mother in our representative sample. Interestingly, education level of mothers was higher than this level among fathers. However, only 5.1% of mothers were working outside of their home.

Further, our data showed that about 60% of families had low economic status whereas; about 85% of families reported proportionately high level of food security. This

shows that families in the area of our study attempt to provide their members with an acceptable level of food security despite their undesirable economical situation. This means that among many families with low socio-economic status, children are not suffering from a nutrition deficiency situation. Our findings about the prevalence of stunting and underweight among families confirm this. Several factors could be accounted for this situation. For example, high level of mothers' education could be the main reason for which a big majority of mothers (about 73%) have fed their babies with breast milk during the first six months of their child, exclusively. Or about 80% of mothers were steel breastfeeding their children at the time of data collection when it was several months past (9.4 months) from the first six months of children's life (mean age of children= 15.4 months). Another reason is that about 93% of mothers in our study were attending to health education classes, which is considerably high. On the other hand, as it is mentioned above, more than 80% of families in our random sample had only one or two children which is quite different from what is expected for families living with low economic status.

Our findings showed that the proportion of children who were suffering from stunting was 11% and this proportion for children with underweight was 2.9%. These proportions are lower than the results of Fekadu etal who reported the prevalence of stunting and underweight among infants and young children between 6 and 24 months old as 22.9% and 19.5%, respectively, in one city of Ethiopia [19]. The prevalence of stunting among children between 6- 59 months in Somalia was also reported as 31% by Kinyoki [20]. These prevalence rates are considerably higher than what is found in our study. However, our results are only reported for 6-24 months old children. It is estimated that 45% of all child deaths happened in 2011 was due to undernutrition, stunting, wasting, and deficiencies of vitamin A and zinc along with suboptimum breastfeeding [21]. The prevalence of stunting among children in Tanzania is reported as about 50% [22].

A study conducted in northeast area of Iran reported the prevalence of underweight and stunting, as 7.5%, and 12.5% respectively [23]. The prevalence of underweight and stunting among 6-24 months old children living in the middle area of the country is reported as 11.7% and 11.5%, respectively [24].In a study in West Azerbaijan by Eslamlou *et al*, the prevalence of underweight and stunting among children under five years old were estimated as 4.3% and 8.7%, respectively [25]. Another study in the same area (West Azerbaijan) reported underweight among 2.3% and stunting in 7.3% of children between 6-24 months old [26]. UNICEF reported that 11% and 15% of Iranian under five years children suffer from underweight and stunting respectively [27]. These results obtained from different parts of the country are similar to what is found in our study. Overall, the pictures of underweight and stunting among 6-24 months in our population and also in the other parts of the country shows that the prevalence of

these health problems among children in this age group are lower than what is reported for other developing countries. Regarding the economic situation of people living in Iran, it should be investigated that which factors are plying their positive role to generate this considerable difference.

It seems research to identify the factors associated with nutritional status of young children (6–24 months) could help with reorganizing programs targeted to reduce underweight and stunting in both developing and developed countries.

Among factors studied in our study, mother's education status and the level of food security in the family were significantly associated with stunting. However, there was no significant association between mother's education status and underweight. Based on the regression model there were also significant association between stunting and the economic status of the family, children height and weight at birth, and attending mothers in educational programs. According to this model factors associated with underweight were food security in child's family, the economic status of the family, children weight at birth, having snacks between meals, and children diarrhea in the last 15 days. Interestingly, despite what is observed for stunting (height for age), underweight was not associated with children height at birth, and attending mothers in educational programs.

Although low prevalence of stunting and underweight in our study could not show that no further attempts are needed to reduce these health problems, there might be lessons in this result for the other developing communities. Majamanda *et al*. suggested that community-based nutrition education improves the nutrition status of children under-five in developing countries [28]. Factors related to the positive situation in our study should be investigated. The results might be valuable for planning in other communities in developing countries as direct significant association is reported between poverty and stunting (or/and wasting) among children [29].

Similar to our results, Kinyoki *et al*. reported the association between diarrheal diseases and underweight [20] in Somalia. Asfaw *et al*. findings also confirmed diarrhea (at the last two weeks), was significantly associated with stunting [30]. Our findings confirm Emamian *et al*. results that showed mothers' education is the most important factors associated with stunting [31]. Although mother' education was not associated with underweight based on our results, in order to improve physical growth of children aged 6 to 24 months, educational programs targeting on to enhance the mothers' education level seems effective.

V. Conclusion

This is concluded from our results that the prevalences of stunting and underweight among 6-24 months old children in the area of our study, similarly to many other parts of the country, are low comparing to many other developing communities. There are some factors related

to these health problems listed in this research. More investigations are recommended to work on determinants factors.

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