



## WEIGHT AND HEIGHT FOR AGE STATUS OF CHILDREN AGED 2-6 YEARS OLD IN SOUTHERN PART OF IRAN: A CROSS-SECTIONAL STUDY

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### ABSTRACT

**Background:** there is an increased risk of mortality and impaired cognitive development for malnourished children. Investigating the poor growth rate of children is crucial. This study aimed to determine the prevalence of short stature and low weight for age in children aged 2-6 years old. **Method:** In a cross-sectional study 450 children aged 24-72 months old were selected by a multistage cluster sampling method that were monitored for their growth status by 9 health centers in Bandarabbas. The anthropometric indicators were compared with the world health organization growth charts. The tenth percentile was used as a cutoff for weight and height for age.

**Findings:** There were not any significant difference in the prevalence of short stature and low weight for age between girls and boys. More than 30% of children had low weight and height for age. Maternal anthropometric measures were related to children birth measures: Maternal height was correlated with birth height ( $r=0.126$ ,  $p<0.05$ ) and birth weight ( $r=0.11$ ,  $p<0.01$ ) after controlling for LBW.

**Conclusion:** Growth rate less than 10<sup>th</sup> percentile were prevalent in this study. Education of parents and interventional studies about complementary nutrition are needed to improve the growth rate of children.

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### Introduction

Stunting prevalence has been decreasing slowly and it is reported that 165 million children were stunted in 2011 [1]. Undernutrition, consisting of fetal growth restriction, stunting, wasting, and deficiencies of vitamin A and zinc, along with sub optimum breastfeeding, underlies nearly 3.1 million deaths of children younger than 5 years annually worldwide, representing about 45% of all deaths in this group [2]. Among 3542 Malaysian children aged 6 months to 12 years old the prevalence of low weight for age and low height for age were 5.4% and 8.4%, respectively [3]. The overall prevalence of stunting was 25.2 in urban areas of Indonesia (n=7211) [4].

Stunted growth reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions. On a population basis, high levels of stunting are associated with poor socioeconomic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices. Similarly, a decrease in the national stunting rate is usually indicative of improvements in overall socioeconomic conditions of a country. The worldwide variation of the prevalence of low height-for-age is considerable, ranging from 5% to 65% among the less developed countries [5].

Hoddinott et al., suggested there are consequences of short stature for adults. A 1-SD increase in HAZ was associated with more schooling (0.78 grades) and higher test scores for reading and nonverbal cognitive skills (0.28 and 0.25 SDs,

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respectively), characteristics of marriage partners (1.39 y older, 1.02 grade more schooling, and 1.01 cm taller). A 1-SD increase in HAZ was associated with increased household per capita expenditure (21%) and a lower probability of living in poverty (10 percentage points). Conversely, being stunted at 2 years was associated with less schooling, a lower test performance, a lower household per capita expenditure, and an increased probability of living in poverty [6].

As these indicators are increasingly used in programmatic and research settings to improve children's health this study aimed to determine the prevalence of short stature and wasting in children aged 2-6 years old in southern part of Iran and assess the relationship of child anthropometric outcomes and feeding pattern, birth weight and parents' anthropometric measures.

### Methods

This is a cross sectional study among children aged 2-6 years old in Bandar Abbas, Hormozgan province of Iran during 2014-15. A total of 600 children were recruited using multistage cluster sampling method. There were 9 out of 11 active health centers in Bandar Abbas during the study and 50 children were randomly selected in each center for 5 different age groups. Anthropometric measures including weight and height, birth weight and height, parents' height and the history of breastfeeding were gathered by a trained health technician. The exclusion criteria of the study were any history of metabolic or hormonal diseases, thalassemia, inborn malformations and parents with genetically short stature. The children had regular follow ups in the centers and all health records were in their charts. Digital scaling and stadiometer were used for measuring weight and height. The scale was calibrated after weighing 45 children. Weight and height measured twice and the average of two measurements was recorded.

The anthropometric measures were compared with standard growth chart of the world health organization (WHO) for boys and girls separately. The height and weight for age less than 10 th percentile were considered stunting and wasting, respectively.

Feeding was categorized to inclusive breast feeding for at least 6 month, formula and combination of formula and breastfeeding. Quantitative measures are reported as mean  $\pm$ SD and frequency as number (%).

Kolmogorov-Smirnov test were used for parametric and non-parametric variables. Groups were compared by t-test and ANOVA test and non-parametric variables such as recent weight were compared with Mann-Whitney and Kruskal-Wallis tests. For qualitative variables Chi square were used. P value <0.05 was considered significant.

### Findings

A total of 450 children were studied and there were 235 and 215 boys and girls, respectively. Mean age was  $43.1 \pm 13.3$  months old. The birth weight and height, recent weight and height are shown in table1.

75% of children were breastfed exclusively, 7% were fed by formula and for the rest of studied children a combination of two methods were used.

The prevalence of short stature and wasting were presented in table2. There were significant differences in the frequency of low weight for age between two sexes for the age group 24-35 months old ( $p < 0.01$ ) but not for stunting prevalence.

There was not any significant correlation between birth weight, height and the current height or weight. In comparing those who were low birth weight (<2500g) and normal birth weight (>2500-3500 g), the frequency of short stature was lower in the second group ( $p < 0.05$ ).

There was not any significant correlation between recent weight/ height and history of breastfeeding.

Maternal height was correlated with birth height ( $r = 0.126$ ,  $p < 0.05$ ) and birth weight ( $r = 0.11$ ,  $p < 0.01$ ) after controlling for LBW.

### Discussion

The result of this study showed that the prevalence of weight and height for age less than 10<sup>th</sup> percentile were more than 30 percent in different age groups. Maternal anthropometric measures were positively related to birth height and weight. There were no relationship between pattern of feeding by formulae or breastfeeding and anthropometric indicators of studied children.

In the current study, short stature was prevalent among the group who were born LBW.

In a study in the capital of Iran, Esfarjani et al., reported that children with a birth weight of >3000 g were less likely to be stunted in school ages (OR: 0.25:95% CI: 0.11-0.54) compared with those with a birth weight of <3000 g [7]. Nutritional status, breastfeeding are suggested as important factors which can affect this relationship.

An analysis of a large dataset of surveys from 20 developing countries (168,000 infants and small children from the Demographic Health Survey, United States Agency for International Development) indicates that exclusive breastfeeding until 6 months is associated with significantly higher weight, length, and lower probability of stunting, wasting, and infections[8]. There were not any significant effects of the feeding methods on growth status in Bandarabbas but as the period of exclusive breastfeeding was gathered by recall, therefore it can be over-reported. Also complementary nutrition is a factor that needs to be investigated. In a study by Jones et al., breastfeeding indicators demonstrated negative associations with height for age Z-score (HAZ), while indicators of diet diversity and overall diet quality were positively associated with HAZ in Bangladesh, Ethiopia, India and Zambia ( $P < 0.05$ ) [9].

### Conclusion

We found that birth weight and maternal heights are factors contributing to the pattern of growth in children 2-6 years old in Bandarabbas. There were limitations in this study because of the cross-sectional design and recall of breastfeeding or other

methods of feeding children. Complementary nutrition needs to be studied for further researches. Determination of factors affecting weight and height of children may help the policy makers and health system to approach malnourished children with effective strategies to improve their growth pattern and decrease burden of malnutrition.

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**Table 1.** Mean±SD of anthropometric measures for studied children

	Girls n=209	Boys n=241	Pvalue
Birth weight(g)	3032.5±451.8	3066.7±456.7	0.427
Birth height(cm)	48.7±3.1	48.9±2.8	0.390
Recent weight(kg)	14.151±2.8	13.75±2.6	0.119
Recent Height (cm)	96.5±9.8	95.1±9.4	0.136

**Table 2.** Prevalence (%) of stunting and wasting in two sexes

Age (month)	Girls		Boys		Pvalue	
	Short stature	Wasting	Short stature	Wasting	Short stature	Wasting
24-35	34(51)	25(37)	61(63)	53(55)	0.294	0.002
36-47	20(44)	25(56)	37(60)	36(58)	0.104	0.954
48-59	31(59)	37(71)	34(69)	39(79)	0.59	0.442
60-72	23(52)	24(54)	14(42)	23(70)	0.54	0.356

Chi-square test was used.