

ORIGINAL ARTICLE

## Anthropometric Indices of Primary School Children in Golpayegan City during 2006-2007

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### ABSTRACT

**Background:** In both clinical and community-based studies, weight-for-age Z scores (WAZ) is used for diagnosing and monitoring malnutrition. Height-for-age Z scores (HAZ) is used to diagnose people with growth failure. We aimed to evaluate the anthropometric indices of primary school children in Golpayegan city and to find if such measurements can lead to an accurate estimate of children's growth.

**Methods:** Anthropometric indices of school children were checked in 2006 and repeated in 2007 using standard instruments and by trained staff.

**Results:** 2% of children in urban areas and 2.5% of children in rural areas had moderate and/or severe malnutrition both in WAZ and HAZ indices. 1.3% of boys and 2.7% of girls had moderate and/or severe malnutrition in 2006. In 2007, 5.3% of the children had WAZ<-2 and 3% had HAZ<-2.

**Conclusion:** It is recommended that food basket of people in Golpayegan be evaluated to find their food pattern and by scrutinizing its strengths and weak points a suitable pattern be proposed for people living in other parts of the country.

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### Introduction

In both clinical and community based studies, weight-for-age Z score (WAZ) is used for diagnosing and monitoring malnutrition. The index is also used in international child growth monitoring (1) and to evaluate nutritional status of various communities (2).

Height-for-age Z scores (HAZ) is used to diagnose people with growth failure, which is more prevalent than slimness in third world countries including ours (3, 4). Currently, it is believed that socioeconomic poverty is responsible for prepuberty short stature, which is reasonably modifiable, instead of genetic factors (5-10).

It is obvious that mortality and morbidity rate in

children and adolescents with growth retardation is more than their normal counterparts (11). Also, recovery after an infectious disease in such children is achieved later than healthy children (12, 13). Children with growth retardation are also more vulnerable in studying and thinking than other children (14-17).

The aim of this study was to evaluate the anthropometric indices of primary school children in Golpayegan city and to find if such measurements can lead to an accurate estimate of children's growth.

### Materials and Methods

School health care providers of Golpayegan city

measured the height and weight of the children in 2006 and the acquired data were transferred to our department. Children's age were recorded according to their birth certificates.

In order to double check the results which were different from what was already obtained from other parts of the country, another confirmation study was done in 2007 using standard instruments and by qualified and trained examiners.

## Results

The results of the obtained data in 2006 for mean age, height, weight, HAZ, and WAZ in urban and rural populations are shown in table 1. The mentioned data for boys and girls subgroups, which showed significant differences are shown in table 2.

2% of children in urban areas and 2.5% of children in rural areas had moderate and/or severe malnutrition both in WAZ and HAZ indices (table 3).

1.3% of the boys and 2.7% of the girls had

moderate and/or severe malnutrition in 2006 (table 4).

The reconfirmation study which was done in 2007 using standardized instruments and by trained staff showed the following: mean age, height, weight, HAZ, and WAZ in urban and rural populations are shown in table 5.

The mentioned data for boys and girls subgroups are shown in table 6.

Percent of children in urban and rural areas who had moderate and/or severe malnutrition both in WAZ and HAZ indices are shown in table 7.

Such percent in boys and girls in 2007 are shown in table 8.

## Discussion

Nutritional problem exists in a country if more than 40% of the children have chronic malnutrition ( $HAZ \leq -2$ ) or more than 30% of the children have acute malnutrition ( $WAZ \leq -2$ ) (18).

According to the reports by WHO in 1997 and by UNICEF in 1999, the prevalence of chronic malnutrition in developed countries was 36%

**Table 1:** Mean and standard deviation of anthropometric indices in urban and rural populations in Golpayegan in 2006

Studied populations	Age (month)	Weight (kg)	Height (cm)	WAZ	HAZ
N=740 Urban	102.6±7.9	27.5±6	131.1±6.1	0.136±1.7	0.392±1.6
N=322 Rural	103.6±6.3	26.5±4.9	130.8±6.3	-0.278±1	0.118±1.1
N=1062 Total	102.9±7.5	27.2±5.7	131.04±6.3	0.006±1.5	0.309±1.5

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

**Table 2:** Mean and standard deviation of anthropometric indices according to sex in Golpayegan in 2006

Variables of studied populations	Age (month)	Weight (kg)	Height (cm)	WAZ	HAZ
N=512 Girls	102.8±8.1	26.7±5.6	130.6±6	0.01±1.8	0.365±1.7
N=550 Boys	103.3±6.8	27.7±5.7	131.4±6.2	0.002±1.3	0.264±1.2
N=1062 Total	102.9±7.5	27.2±5.7	131.04±6.3	0.006±1.5	0.309±1.5

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

**Table 3:** Number and percent of students with malnutrition in urban and rural areas in Golpayegan city in 2006

Variables of studied populations	WAZ<-2		HAZ<-2	
	Number	percent	Number	percent
Urban N=740	17	2	14	2
Rural N=322	8	2.5	8	2.5
Total N=1062	25	2.3	22	2.1

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

**Table 4:** Number and percent of students with malnutrition according to sex in Golpayegan city in 2006

Variables of studied populations	Waz<-2		Haz<-2	
	Number	Percent	Number	Percent
Women N=512	6	1.2	7	1.3
Men N=550	19	3.5	15	2.7
total N=1062	25	2.3	22	2.1

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

**Table 5:** Mean and standard deviation of anthropometric indices in urban and rural populations in Golpayegan city in 2007

Variables of studied populations	Age (month)	Weight (kg)	Height (cm)	WAZ	HAZ
N=660 urban	76.2±3.9	20.8±4.01	117.1±5.7	-0.15±1.5	-0.02±1.2
N=312 rural	76.05±3.8	19.9±4.3	115.9±4.3	-0.37±1.65	-0.24±1.5
N=972 total	76.17±3.9	20.5±4.1	116.7±6.8	-0.19±1.6	-0.06±1.4

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

**Table 6:** Mean and standard deviation of anthropometric indices according to sex in Golpayegan city in 2007

Variables of studied populations	Age (month)	Weight (kg)	Height (cm)	WAZ	HAZ
N=482 women	76.2±3.7	20.1±4.2	116.3±7.8	-0.2±1.3	-0.02±1.2
N=490 men	76.1±4.1	20.9±4.02	117.2±5.5	-0.31±1.5	-0.14±1.2
N=972 total	76.17±3.9	20.5±4.1	116.7±6.8	-0.19±1.6	-0.06±1.4

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

**Table 7:** Number and percent of students with malnutrition in urban and rural areas in Golpayegan city in 2007

Variables of studied populations	Waz<-2		Haz<-2	
	Number	Percent	Number	Percent
Urban N=660	30	4.5	15	2.3
Rural N=312	23	7.3	14	4.5
Total N=972	53	5.4	29	3

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

**Table 8:** Number and percent of students with malnutrition according to sex in Golpayegan city in 2007

Variables of studied populations	Waz<-2		Haz<-2	
	Number	Percent	Number	Percent
Women N=482	23	4.7	10	2
Men N=490	30	6.1	19	3.9
Total N=972	53	5.4	29	3

WAZ: Weight-for-age Z score; HAZ: Height-for-age Z scores

and for acute malnutrition was 24% (18, 19).

Such percents in East Africa were 47% and 26% and in Ethiopia were 64% and 47%, respectively (20).

The latest studies about malnutrition in Iran show that the disease has decreased significantly during the last 15 years (from 27% to 11%). But protein energy malnutrition is still prevalent in urban and rural populations (21, 22).

Published studies about growth of Iranian children during the last 20-30 years show that weight and height of Iranian children in puberty period have significantly increased (23).

The age of menarche in Iranian girls is lower than European girls (24). It was reported to be 12.5 years in a study and 13 years in another study (25).

But in most studies Iranian children's growth is less than American or English children of the same age (21, 22, 23, 26).

We found that in 2006 less than 2.3% of primary school children in Golpayegan city had WAZ<-2 and 2.1% had HAZ<-2. None of the studied children in our study were below the fifth percentile.

Having considered such facts, it can be concluded that although Iranian children's growth has been significant after the Islamic Revolution, 11% of children in big cities have still moderate and/or severe malnutrition.

What we found was not similar to any other studies in the country or abroad. So there were two possibilities for the different results; firstly it was possible that human error had led to wrong measurements of children's weight and height.

The second possibility was that the quantity and quality of food basket of Golpayegan inhabitants had led to lower malnutrition in their children.

To find the reasons of such differences we

repeated the study in 2007 using standardized instruments and by trained staff to check the weight and height of first-year primary school children.

As shown in tables 7 and 8, although 5.3% of the children had WAZ<-2 and 3% had HAZ<-2, their malnutrition status is still better than other studied students in other Iranian cities.

Our results show that means of weight and height of our studied children are similar or better than the 50th percentile of weight and height of school children in Shiraz in 2004 (27).

It is recommended that food basket of people in Golpayegan be evaluated to find their food pattern and by scrutinizing its strengths and weak points a suitable pattern be proposed for people living in other parts of the country.

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### Conflict of Interest

None declared.

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