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The Prevalence of Low Weight in Children under 6 Years Old in Lordegan City in 2015-2016

Masoud Amiri[1], Mehdi Naderi Lordejani[*2], Hussein Fallahzadeh[1], Hassan Askarpour[3]

1. Department of Statistics and Epidemiology, Yazd School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
2. Department of Disease Management, Department of Health, Shahrekord University of Medical Sciences, Shahrekord, Iran
3. Department of Disease Management, Department of Health, Yasouj University of Medical Sciences, Yasouj, Iran

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Corresponding Author:
Mehdi Naderi Lordejani
lordejani@yahoo.com

ABSTRACT

Introduction: Human health is affected by heredity and environment. The issue of inheritance is of paramount importance, but the impacts of environmental factors and nutritional conditions sometimes go beyond the hereditary factors. Investigation of the status of child development is the most important criterion for identifying the health status. The aim of this study was to investigate the prevalence of underweight children in Lordegan City during 2015-2016.

Methods: This descriptive-analytical cross-sectional study was carried out on 900 children under 6 years of age in Lordegan in 2015-2016. Sampling was performed using two-stage cluster sampling method. Data were collected using observation and interview by filling out a questionnaire. Collected data were analyzed using SPSS.V 22 software, independent T-test, and Chi-Square tests at a significant level of 0.05.

Results: In this study, 900 children were studied; 49% (441 persons) were female and 51% (459) were male. Of this number, 700 (77.7%) were of normal weight, 155 (17.3%) were moderately underweight, and 45 (5%) were severely underweight. The highest prevalence of malnutrition in boys and girls was at the age of 2 and 3 years, respectively. Moreover, 91.1% of the population lived in the village, 8.4% lived in the city, and 0.5% were living in the suburbs and tribes. In this study, a significant relationship was found between illiteracy of parents, breakfast in the week, place of living, main meal per day, age of the child, number of children in the family, hospitalization of the child due to illness, maternal number of pregnancies, and low weight prevalence ($p \leq 0.05$).

Conclusion: Regarding the results and their comparison with the standard weight, environmental factors can be effective in delaying weight gain. Therefore, educating health care and parental care for proper nutrition can lead to children's health at this stage of growth.

Keywords: Prevalence, Low weight, Children under six years, Lordegan

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Introduction

Human health depends on heredity and environment. The issue of inheritance is of paramount importance, but the impacts of environmental factors and nutritional conditions sometimes go beyond the hereditary factors. A review over the children's developmental status is the most important criterion for identifying their health (1).

One of the global challenging problems with regard to the health organizations is malnutrition in children. In developing and less developed countries, malnutrition is called "developmental deterrence syndrome", which includes a range of disorders such as growth impairment, delayed mental development, brain and behavior, increased disability, and even mortality. Growth disorders are usually associated with other nutritional deficiencies, such as vitamin A, iron, and zinc deficiencies. This exacerbates the effects of malnutrition, especially during the period of intrauterine growth and the first trimester of life (2, 3). Children under one standard deviation (SD), two SDs, and three SDs from the standard average of the National Center for Health Statistics (NCHS) showed mild, moderate, and severe underweight, respectively. In taking care of children, underweight reflects acute and chronic malnutrition or both (4). According to the World Health Organization (WHO) recommendations, about 98 million children under five years old were underweight, of which about 53 million live in South Asia. In addition, one out of every six children under the age of five is underweight in developing countries (5).

According to WHO, more than 30% of children under the age of 5 years suffer from growth impairment, with 80% falling in height, and 17% decrease in weight (6).

In Iran and the world, children's malnutrition problem, especially underweight and short-term nursing, has been considered as one of the prevalent problems in vulnerable groups and several studies have been conducted in this regard. Worldwide estimates show that 35.8% of the pre-school children are underweight, 42.7% are short, and 9.2% are lean in developing countries (7).

In recent studies in Iran in children under 5 years, the percentages of moderate to severe short stature, moderate to severe slimming and moderate to severe weight loss were reported respectively 16.3%, 4.2% and 8.6% in West Azarbaijan province (8). In a cross-sectional-analytic study, 7.6% of children under 5 years of age were underweight (9). Houshyar Rad et al. indicated that 23% of children under the age of 6 were underweight (10). Wagari et al. mentioned that chronic malnutrition (stunted growth retardation) was greater than acute malnutrition (stunted growth retardation) (11).

In a Bangladeshi study on children under five years, 41% of children were underweight, 43% had short stature, and 17% were thin. One of the major causes of low birth weight was low birth weight, while in Bangladesh the main cause was cessation of the intrauterine growth (12).

According to a study by Marzieh Nejomi, the most frequent problem was short stature, while the least frequent problem was about weight. Thus, malnutrition has been considered as one of the major problems in recent years. The underweight was more prevalent in girls than boys, but short stature and weight loss were more frequent in boys than girls (13).

Another study in Africa examined the incidence of malnutrition in children under 6 years of age. The results showed that various factors influenced malnutrition such as weight to age and height to age ratios. The effect of socioeconomic factors on weight and malnutrition remained high after eliminating the effects of height and BMI on mother and birth weight. However, socioeconomic factors had no effect on age and malnutrition (14).

Considering the importance and disadvantages of disorder or delay in the development of children, the lack of a similar study in Lordegan City, as well as reflection of community health based on children's health indicators such as underweight, this study was conducted.

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Methods

This descriptive cross-sectional study was conducted to assess the prevalence of underweight in children under 6 years of age in Lordegan City, Chaharmahal-e-Bakhteyari province, Southwest of Iran during 2015-2016. The two-stage cluster sampling method was carried out in three areas of Fellard, Janaki, and Khanmirza. From each region, 10 health centers were randomly selected. In the final stage, 30 children were selected from each health center.

The sample size was calculated as 385 people based on the permissible error of less than 0.05 Amount of P was set at 0.05.and the following formula.

$$n = \frac{Z^2 \times P(1-P)}{d^2}$$

In order to achieve a generalizable result and to have a community readily available to study over numbers, it was decided to study 900 people.

Questionnaire consisted of demographic data, performance awareness questionnaires, maternal and child's physical status, nutritional status, how to care, income, and parental education level. The Cronbach's alpha coefficient was 0.83. Children with thalassemia, hypothyroidism, physical and mental anomalies, anemic, cerebral palsy, admission to ICU, and parents' dissatisfaction were excluded. Questionnaires were completed by participants after they were provided with the required instructions by the midwives in health centers. As a result, all the children whose parents agreed for their participation in the study and had no specific medical problems participated in the study. The studied variables included age, gender, mother's occupation, mother's education, baby feeding method (EBF: Exclusive Breast Feeding, Predominant Breast Feeding: PBF), onset of supplementary feeding, pastry consumption (milk), child's history of hospitalization, use of multivitamins and iron drops, number of children in the family, the distance between births in the family, and the mother's information about the growth curve.

In order to determine which children were underweight, the child's weight was compared with that of a standardized population, i.e., the WHO NCHS information collection (15), which provides the weight of well-fed American children. The children's height and weight mean and SD were examined by their age and gender. After data collection, they were analyzed using SPSS version 20 software using independent T-test and Chi-Square tests at a significant level of 0.05.

Results

In this study, 900 children were studied; 49% (n = 441) were girls and 51% (n = 459) were boys. In terms of location, 8.4% lived in city, 91.1% in the village, 0.3%in the city suburbs, and 0.2%in the nomadic areas.

In the mothers group, the highest frequency belongs to the level of education below diploma, which is 77.7%.

In the group of fathers, the highest frequency belongs to the level of education under the diploma, which is 67.8%. Considering the type of breast feeding, 61.4% of children had EBF up to 6 months of age. We also observed that 5.7% of fathers were unemployed, 63.9% were workers, 6.6% were employees, and 23.9% were working in other businesses. In addition, 65.2% (n = 586) and 84.1% (n = 757) of children received iron and multivitamin, respectively. In addition, 22.2% (n = 200) of the children had experienced hospitalization. In the case of iron drops, 68.3% (n = 615) of the children were completely undernourished, 19.8% (178 person) had incomplete reception, and 3.4% (n = 31) did not receive iron drops at all. Households with livestock and poultry (n = 192) collected and stored 41.6% (n = 375) of their livestock and poultry waste unsafely. Based on the findings, 30.8% (n = 277) of mothers had a history of pregnancy, 34.3% (n = 309) had a history of 2 pregnancies, 20.4% (n = 184) had a history of 3 pregnancies, and the rest had a history of more than 4 pregnancies.

Among children, 32 (3.6%) were the result of multiple pregnancies and 76.2% of them were the only child. It should also be noted that 20.2% of the respondents did not answer to the above-

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mentioned question. The highest frequency of children was in the age group of 4 to 5 years, while the lowest was in the age group of older than 5 years.

The results indicated that 19.2% of their mothers started their child's nutrition at the age of 6 months. In terms of the number of daily meals per day, 54.3% did not answer to the question, but among the responses, 1.2% received one serving per day, 7.9% received 2 meals a day, 41.1% received 3 meals a day, and 49.6% received more than 3 meals per day on their main meal. In Table 1, the mean and SD of children's height and weight are presented based on their age and gender. Tables 2 and 3 show the participants' height and weight per age based on the SD of the NCHS. According to Table 2, 33.34% and 5.76% of the boys had a height and weight of lower than 2 SDs, respectively. In this regard, 18.19 and .78 of the boys had a height and weight of lower than 3 SDs, respectively. According to Table 3, 30.57% and 6.41% of girls had a height and weight of lower than 2 SDs, respectively. Furthermore, 17.98% and 89.8% of girls had a height and weight of lower than 3 SDs, respectively. These results were set on the criteria set by NCHS in terms of height and weight.

Table 1. Described height and weight by age

(±SD) Cm Height		(SD) Kg Weight		Number		Age
Girl	Boy	Girl	Boy	Girl	Boy	(Month)
62.54 (9.65)	62.68(10.88)	7.24 (2.15)	7.45(2.24)	59	65	6
75.10(10.5)	75.78(10.6)	10.72 (2.23)	10.87 (1.46)	48	52	18
85.45 (11.34)	84.45 (13.65)	12.57 (2.86)	13.68 (1.96)	98	102	30
90.65 (12.09)	91.55 (12.22)	14.34(1.83)	14.76 (1.79)	83	85	42
96.32 (16.43)	98.10 (17.45)	15.65 (1.97)	16.16(1.85)	106	107	54
108.12 (13.10)	109.34(12.11)	17.22 (2.43)	17.47(2.37)	46	48	66

Table 2. Relative frequency of height and weight sizes regarding boys' age based on SD

-3SD		-2SD		-1SD			
Weight Frequency (percent)	Height Frequency (percent)	Weight Frequency (percent)	Height Frequency (percent)	Weight Frequency (percent)	Height Frequency (percent)	Frequency (Number)	Age (Month)
0(%0)	8(%8.24)	4(%4.12)	24(%24.74)	18(%18.55)	43(48.45%)	97	0-12
1(%1.16)	11(%12.79)	4(%4.65)	20(%23.25)	15(%17.44)	40(69.35%)	86	12-24
1(%0.99)	11(%10.89)	4(%3.96)	24(%23.76)	21(%20.79)	40(%39.60)	101	24-36
0(%0)	5(%6.84)	2(%2.73)	21(%28.76)	14(%19.17)	31(%42.46)	73	36-48
2(%1.96)	10(%9.80)	4(%3.92)	23(%22.54)	21(%20.58)	42(%41.17)	102	48-60
4(%0.87)	45(%9.80)	18(%3.92)	112(%24.40)	89(%19.38)	191(%41.61)	459	Total

Table 3. Relative frequency of height and weight sizes regarding the girls' age based on SD

-3SD		-2SD		-1SD			
Weight Frequency (percent)	Height Frequency (percent)	Weight Frequency (percent)	Height Frequency (percent)	Weight Frequency (percent)	Height Frequency (percent)	Frequency (Total)	Age (Month)
0(%0)	6(%6.66)	6(%6.66)	21(%23.33)	17(%18.88)	40(%44.44)	90	0-12
1(%1.19)	11(%13.09)	4(%4.76)	19(%22.61)	14(%16.66)	35(%41.66)	84	12-24
1(%1)	11(%11)	2(%2)	24(%24)	22(%22)	40(%40)	100	24-36
1(%1.47)	6(%8.82)	2(%2.94)	17(%25)	12(%17.64)	30(%44.11)	68	36-48
1(%1.01)	14(%14.14)	5(%5.05)	22(%22.22)	19(%19.19)	38(%38.38)	99	48-60
4(%0.90)	48(%10.88)	19(%4.30)	103(%23.05)	84(%19.04)	183(%41.49)	441	Total

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Figures 1 and 2 show the trend of weight gain in children below the age of 6 years in Lordegan City regarding the NCHS standard mid-point curve.

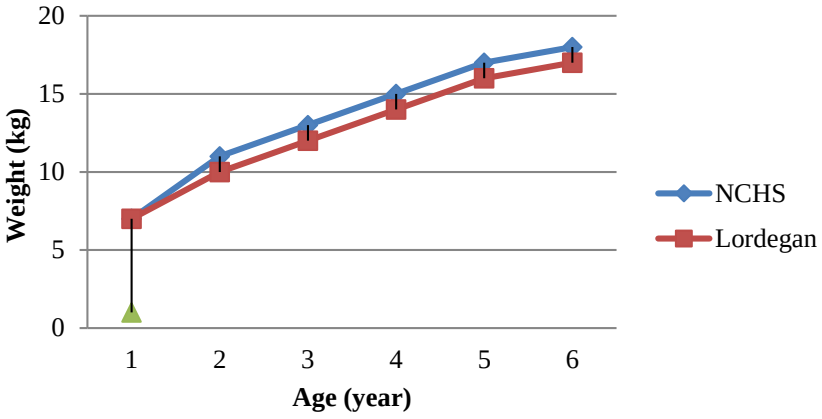


Figure 1. Weight gain of girls compared to NCHS standard

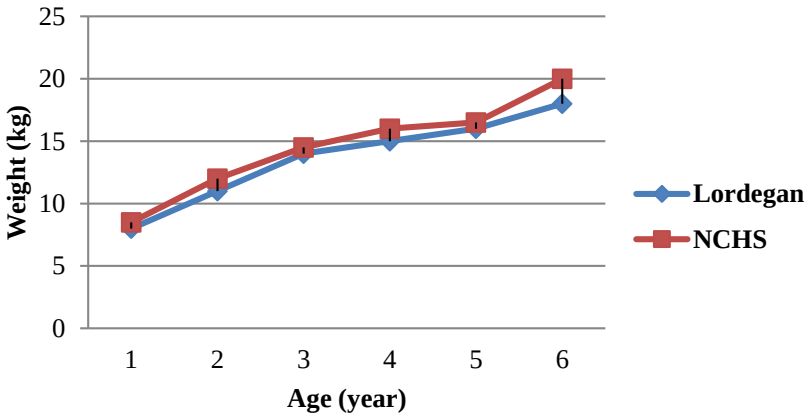


Figure 2. Weight gain of boys compared to NCHS standard

By increase of age, the weight gain curves for boys increased compared with the standard curve. The average weight of girls was in line with the NCHS standard curve up to 30 months of age and then showed a tendency toward the bottom. As the age increases in girls, this distance increases. Girls under review were on average 3 months lower than their peers in the NCHS standard. A significant difference was found between the mean and SD weight in boys from 12 months to 6 years of age and in girls from 42 months to 6 years of age ($p < 0.005$). The malnutrition status of the studied children with regard to the type of malnutrition and its severity is presented in Table 4. The prevalence of malnutrition almost increased with increase of age in the studied children. The upward trend of malnutrition prevalence was statistically significant according to the chi-square test. The values of this statistic were for low weighted prevalence trend ($P<0.05$), chi square for trend = 19.84, slim prevalence ($P = 0.05$), chi square for trend (0.01) and Short stature prevalence (chi square for trend = 15/98) was obtained. In this study, a significant relationship was observed between low-weight prevalence and parents' illiteracy, breakfast consumption through the a week, place of living, main meals of the day, number of children in the family, collecting and storing livestock and poultry in the place of residence, the number of mother's pregnancy ($p \leq 0.05$).

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Table 4. Malnutrition status in children under study

Malnutrition status	Underweight Frequency (%)	Thinness Frequency (%)	Stunting Frequency (%)
The Z criterion is greater than -.99 Mild malnutrition	700 (77.7%)	746 (82.9%)	620 (69.9%)
The Z criterion is between -1 and -1.99 Moderate malnutrition	155 (17.3%)	123 (13.6%)	184 (20.4%)
The Z criterion is between -2 and -2.99 Severe malnutrition	41 (4.5%)	26 (2.9%)	68 (7.6%)
Z criterion smaller than-3	4 (0.5%)	5 (0.6%)	28 (3.1%)
Total	900 (100%)	900 (100%)	900 (100%)

Discussion

Dealing with underweight is considered as a key indicator of the countries' movement towards the Millennium Development Goals. However, the research shows that more than a quarter of the world's under five-year children are still underweight. The prevalence of underweight in developing countries is 26%. South Asian region has the highest prevalence of underweight (40%) among the developing countries. Half of the world's poorest children live in the three countries of India, Bangladesh, and Pakistan (16). According to the head of the Iranian Society of Gastrointestinal and Liver Disease, 6% of Iranian children are underweight. In this study, more than one third of the 3-6 year-old children (35.5%) were underweight. A study that investigated the prevalence of underweight in children under the age of 6 years indicated that 23% of children were underweight. In another study over Iranian children under the age of 5 years, it was observed that 7.6% of children were underweight (10). Shaykholeslam assessed the 10-year trend of malnutrition indicators in children under the age of 5 years. It was observed that 5.2% of children were underweight (16). Moreover, the underweight studies mentioned that the major nutritional problems were attributed to children under the age of 6 years. In this study, the highest percentage of underweight in children aged 5 years and over was 13.1% and 7%, respectively. The prevalence of malnutrition in this study and similar studies (13, 17) was relatively lower in girls than males, while the highest malnutrition prevalence in boys was at the age of 2 years and in girls was at the age of 3 years. Although extensive examinations are required to understand the causes of differences between the two genders, increased incidence of weight loss after 2 years of age can be attributed to breastfeeding, auxiliary feeding, maternal rehabilitation, and lack of adequate care of the child due to the next child or pregnancy. Similar studies indicated that the highest percentage of malnutrition was at the age of 3 years regardless of gender (18). Abdullah in Saudi Arabia reported that the most prevalent weight loss occurred between the ages of 1 and 2 years (19). Furthermore, Nilforoushan investigated 393 children from birth to age three and confirmed that if the parents acted on health-care guidelines, the weight gain of children under the age of three years will be in line with the standard (20). This study showed that low weight prevalence was a combination of malnutrition in the present and past, which is contrary to some other studies (19). A significant relationship was found between age of children under study and Low prevalence ($P \leq 0.05$). The age of 6 months is the onset of supplementary nutrition and in this study 93% of the children started supplemental nutrition at this time. Mothers' lack of appropriate level of education and awareness about nutritional supplementations along with the family's economic-cultural poverty led to the child's developmental disorders. In this study, a significant relationship was found between nutritional status of the child in terms of low weight and maternal literacy. Based on the WHO

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in the GOBIFFF strategy to reduce child mortality, maternal education was introduced at the heart of this strategy (21). No significant relationship was found between maternal employment and nutritional status of children, but cases of underweight, particularly in children, were related to mothers' employment status. However, a study showed that maternal employment affected the child' weight loss significantly (22).In this regard, more studies are needed. We also found that 61.4% of children had EBF or PBF, which was significantly associated with underweight; this result was supported by a research (23). The breast milk contains the best quality of nutrition, brings high levels of safety, provides adequate growth for the infant, and prevents children from developing diseases and malnutrition (24). In this study, 58.6% of the infants received regular multivitamins, which is a very low percentage and indicates that Iranian mothers lack adequate education and knowledge in this regard. In a study reception of multivitamins by children had a frequency of about this rate was about 56% (25). A strong statistical correlation was observed between regular consumption of multivitamins and nutritional status of children ($X^2 = 15.68$, $P \leq 0.0005$). Although regular use of multivitamins in addition to infants' milk is recommended to prevent the onset of vitamin D deficiency and does not play a significant role in weight gain, the literature showed a correlation between multivitamins' intake and nutritional status. This study showed a significant relationship between the history of childhood hospitalization and nutritional disorders, which was similar to the research by Nakhshab et al. (25). In this research, a significant relationship was observed between father's literacy and child's low-weight, so that the most prevalence of under-weight and malnutrition were observed in children with illiterate or low-educated fathers. In this study, underweight had a significant relationship with the number of children in family and the household size. According to related studies, the household size of higher than 5 and the number of children higher than 5 were identified as the low-weight risk factors (13). Given that 91.1% of the studied children lived in the village, 85.6% of them were collecting and keeping livestock and poultry residues in their place of residence. Direct exposure of children to livestock and poultry feces is one of the causes of various parasitic diseases and can affect children. Moreover, hospitalization and sickness of children had a financial burden on the family. Therefore, all above-mentioned ideas work together to cause a greater prevalence of underweight in children under study. In comparison of our results with those of the standard, environmental factors can be effective in delaying weight gain. Therefore, education about health care and parental care regarding appropriate nutrition will lead to children's health at their stages of growth. Therefore, we should conduct educational need analyses for the health care staff and provide them with more educational trainings. As a result, they can help mothers and educate them to change their attitude and practice. Mothers should be encouraged to apply the growth card and in the case that their children have decreased trend of growth, they should be referred to nutritionist.

Conclusion

According to the results, it can be concluded that chronic malnutrition (stunted growth) is more severe than acute malnutrition (delayed weight growth) in children under 6 years of age in Lordegan City. Malnutrition in boys is more prevalent than girls. Furthermore, malnutrition and low-weight were on the rise since infancy.

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Conflict of interest

There is no conflict of interest.

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