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## Research Article

# Nutritional Status and Morbidity Profile of School Going Girls Residing in Two Slums of Jaipur City, Rajasthan, India: A Cross Sectional Study

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### Abstract

**Background and Objective:** School going girls belonging to compromised background are more prone to poor nutritional status. The objective of the present study was to assess the nutritional status and morbidity profile of school going girls residing in two slums of Jaipur city. **Materials and Methods:** A cross sectional study was conducted on 260 school going girls aged 10-17 years studying in two private schools of Jaipur city. Their nutritional status was assessed by collecting data on weight and height using standardized techniques. The subjects were classified into different categories of stunting and thinness based on height for age and BMI for age indices. A pre tested questionnaire was developed to collect the data on their morbidity profile of one month prior to data collection. **Results:** Overall, the prevalence of stunting as compared to standard was 30%, of whom 22.7% were moderately stunted and 7.7% were severely stunted. The nutritional status of the subjects regarding BMI for age indices as compared to standard revealed that 20.8% of the subjects were in the thinness category and 9.2% had severe thinness. Almost 46% of the subjects reported to have suffered from some form of illness in the past one month of data collection. **Conclusion:** Overall, 30% of the subjects were stunted and 30% of the subjects had thinness. Thus, reflecting poor nutritional status of school going girls residing in two slums of Jaipur city.

**Key words:** Nutritional status, stunted growth, BMI, growth rate, malnutrition, morbidity profile, slum

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**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

School going girls play a very important role in the future development of the nation. Those who are especially in the age group of 10-17 years need much more attention as this period lays the foundation for good health and sound mind which endures with them throughout their life<sup>1</sup>. Their health as an area of policy option has been given attention by health economists, public health experts, planners, etc. They are recognized not only for what they are today but also for their future roles empowering the work force of the society<sup>2,3</sup>.

Girls belonging to deprived sections of the society are of great concern. The challenging conditions of life in the slum leads to inadequate dietary intake, low health care use, lack of information regarding causes of infectious diseases and its proper treatment<sup>4</sup>. Girls living in such circumstances are at high risk of malnutrition. According to IIPS<sup>5</sup> report, 38% of the children (age = <5 years) in India were stunted and 36% of them were underweight and the data on women of reproductive age (age = 15-49 years) had also revealed poor nutritional status as 23% of the women were underweight (BMI <18.5).

The fact sheets of IIPS<sup>6</sup> Rajasthan state reported that 37% and 27% of the children (age = <5 years) and women (age = 15-49 years) were underweight, respectively. A few studies carried out in Jaipur city, Rajasthan, depict high prevalence of malnutrition. In an urban slum area of Jaipur city, 34.0% of girls (n = 100, age = 13-18 years) were found to be undernourished (BMI <18.5)<sup>7</sup>. In another study, 12.2% of the girls (n = 500, age = 10-19 years) were underweight (BMI <18.5)<sup>8</sup>. In yet another study in Jaipur city, with regard to weight for age criteria, considerable percentage of school going girls (n = 142, age = 10-15 years) were suffering from grade 1 (28.2%), grade 2 (26.1%), grade 3 (14.8%) and grade 4 (2.8%) malnutrition and only 28.2% of them were in the normal category. On the basis of height for age, 35.9% of the girls were suffering from mild stunting, 1.0% had severe stunting and rest of the girls (63.4%) were in the normal category<sup>9</sup>. Hence, it can be ascertained from the above studies that the school going girls belonging to low socio economic group in Jaipur city were suffering from various degrees of malnutrition.

Slum dwellers are also exposed to poor environmental conditions like low quality of food, drinking water and sanitation, unhygienic practices, dirty surroundings and overcrowding. Henceforth, the prevalence of common ailments is quite high among slum dwellers<sup>10</sup>. A few researchers had reported that more than 50% of the girls residing in different slums of India were found to have

suffered from common ailments such as cold and fever, stomach ache, diarrhea, skin problems, eye problems, etc<sup>11,12</sup>. The monitoring of nutritional status of adolescent girls needs much more attention as it is affecting the growth of the country, also. Hence, the present study was planned with the objective to determine the nutritional status and morbidity profile of school going girls residing in 2 slums of Jaipur city, Rajasthan, India.

## MATERIALS AND METHODS

**Study design:** The present study was a cross sectional study carried out among school going girls (n = 260, age = 10-17 years) residents of 2 slums of Jaipur city.

**Study period:** The data were collected between August-November, 2014.

**Locale of the study:** The subjects of the present study were school going girls, therefore, schools were the locale of the study. The University of Rajasthan, Jaipur, is located in Moti Doongri zone of Jaipur city, hence, Moti doongri zone was selected through purposive sampling. With the help of internet, 8 private schools with sizeable number of students and imparting education to unprivileged girls were identified for selection. The principals of these 8 schools were contacted but the principal of only two schools expressed willingness to participate in the study. Moreover, the girls attending these schools were residing in two slums which were also located in Moti Doongri zone of Jaipur city.

**Sample selection:** A list of girl students studying in classes 2nd-12th was obtained from both the schools. Those girls who were in the age group of 10-17 years, not suffering from any medical complications and willing to participate were enrolled for the study. Consequently, a total of 260 girl students from both the schools were included in the study<sup>13</sup>.  
**Ethical clearance:** The ethical clearance was obtained from the Departmental Ethics Committee, Department of Home Science, University of Rajasthan, Jaipur, for carrying out research work on school going girls.

**Data collection:** The nutritional status of the enrolled subjects was assessed by measuring weight and height using standardized tools and techniques. Weight was measured in kilograms (kg) using a calibrated Krup's spring balance with the sensitivity of 0.5 kg and the height was measured with the

help of a calibrated Stature meter' microtoise, with a sensitivity of 0.1 cm. The measured weights and heights of the subjects were used to calculate body mass index (BMI) using the formula:

$$\text{Body mass index} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

The above stated anthropometric measurements were used to calculate height for age and BMI for age using AnthroPlus software developed by De Onis *et al.*<sup>14</sup>. These indices were compared with De Onis *et al.*<sup>14</sup> for school-age children and adolescents (2007) to determine the extent of malnutrition. The z scores for height for age and BMI for age of subjects were used to classify the subjects into different categories of malnutrition.

A pre-tested interview schedule was developed to assess the morbidity profile of the enrolled subjects prior to one month of data collection. It consisted of questions such as morbidity status, types of ailments suffered, measures taken to overcome them and the source from where medicine was obtained.

**Statistical analysis:** All the data were consolidated on excel sheets. Mean, standard deviations, frequencies and percentages were calculated using SPSS 17.0.

## RESULTS

**Weights, heights and BMI:** Mean weights, heights and BMI of the subjects, with respect to age are presented in Table 1. As was expected the mean weights of the subjects increased from 26.2±5.23 kg at 10 years to 43.1±7.67 kg at 17 years.

Table 1: Mean weights, heights and BMI of the subjects age-wise

Subjects (n = 260)								
Age (years)	10 (n = 41)	11 (n = 31)	12 (n = 34)	13 (n = 46)	14 (n = 40)	15 (n = 24)	16 (n = 21)	17 (n = 23)
Weight (kg)	26.2 ± 5.23	28.8 ± 5.57	31.6 ± 5.63	35.6 ± 7.23	39.9 ± 7.95	39.9 ± 5.17	43.6 ± 7.09	43.1 ± 7.67
Height (cm)	131.7 ± 8.00	138.1 ± 7.43	143.2 ± 6.92	147.0 ± 6.34	149.7 ± 6.83	151.2 ± 4.39	151.3 ± 5.04	150.7 ± 5.49
BMI (kg m <sup>-2</sup> )	15.0 ± 2.39	15.0 ± 1.90	15.3 ± 1.97	16.4 ± 2.45	17.7 ± 2.77	17.5 ± 2.13	19.0 ± 2.82	19.0 ± 3.30
Mean ± SD								

Table 2: Age- wise distribution of subjects into different categories of stunting using height for age

		Years								
Z scores	Classification	10 (n = 41)	11 (n = 31)	12 (n = 34)	13 (n = 46)	14 (n = 40)	15 (n = 24)	16 (n = 21)	17 (n = 23)	Total (n = 260)
>-2SD to ≥Median	Normal	25 (61.0)	20 (64.5)	26 (76.5)	33 (71.7)	29 (72.5)	19 (79.2)	16 (76.2)	13 (56.5)	181 (69.6)
<-2SD to -3SD	Moderately stunted	12 (29.3)	11 (35.5)	4 (11.8)	10 (21.7)	7 (17.5)	5 (20.8)	3 (14.3)	7 (30.4)	59 (22.7)
<-3SD	Severely stunted	4 (9.8)		4 (11.8)	3 (6.5)	4 (10.0)		2 (9.5)	3 (13.0)	20 (7.7)

Figures in parentheses () denote percentages, Source: De Onis *et al.*<sup>14</sup>

The mean heights of the subjects had also shown an increase from 131.7±8.00 cm at 10 years of age to 151.2±4.39 cm at 15 years after which the subjects did not show an increase in height. As weight and height increased with age, it was obvious that the BMI of the subjects also increased with age. The BMI of the subjects was 15.0±2.39 kg m<sup>-2</sup> at 10 years of age, which had increased to 19.0±3.30 kg m<sup>-2</sup> at 17 years of age.

### Nutritional status of the subjects as determined by height for age and BMI for age:

On the basis of height for age, the subjects were classified into different categories of stunting. It was observed that 30.4% of the subjects were stunted of whom 22.7% were moderately stunted and 7.7% were severely stunted (Table 2). The rest of the subjects were in the normal category (69.6%). Looking at the data age wise showed that nearly 40% of the subjects were stunted at 10 years and 43.4% were stunted at 17 years. Hence, stunted subjects were present over the entire age range of 10-17 years, which indicated that stunting had started at an early age.

According to BMI for age indices 30.0% of the subjects were undernourished of whom 20.8% had thinness and 9.2% had severe thinness (Table 3). The rest of the subjects were in the normal category (67.3% n = 175) and 2.3% (n = 6) and 0.4% (n = 1) were overweight and obese, respectively. Age wise data showed that there were 34.2% subjects who were undernourished at 10 years and 21.7% subjects who were undernourished at 17 years.

It is apparent from Fig. 1a that the distribution of the subjects was peaked and shifted towards left side indicating that majority of the subjects were below the median and their height for age was less. It can be seen from Fig. 1b that

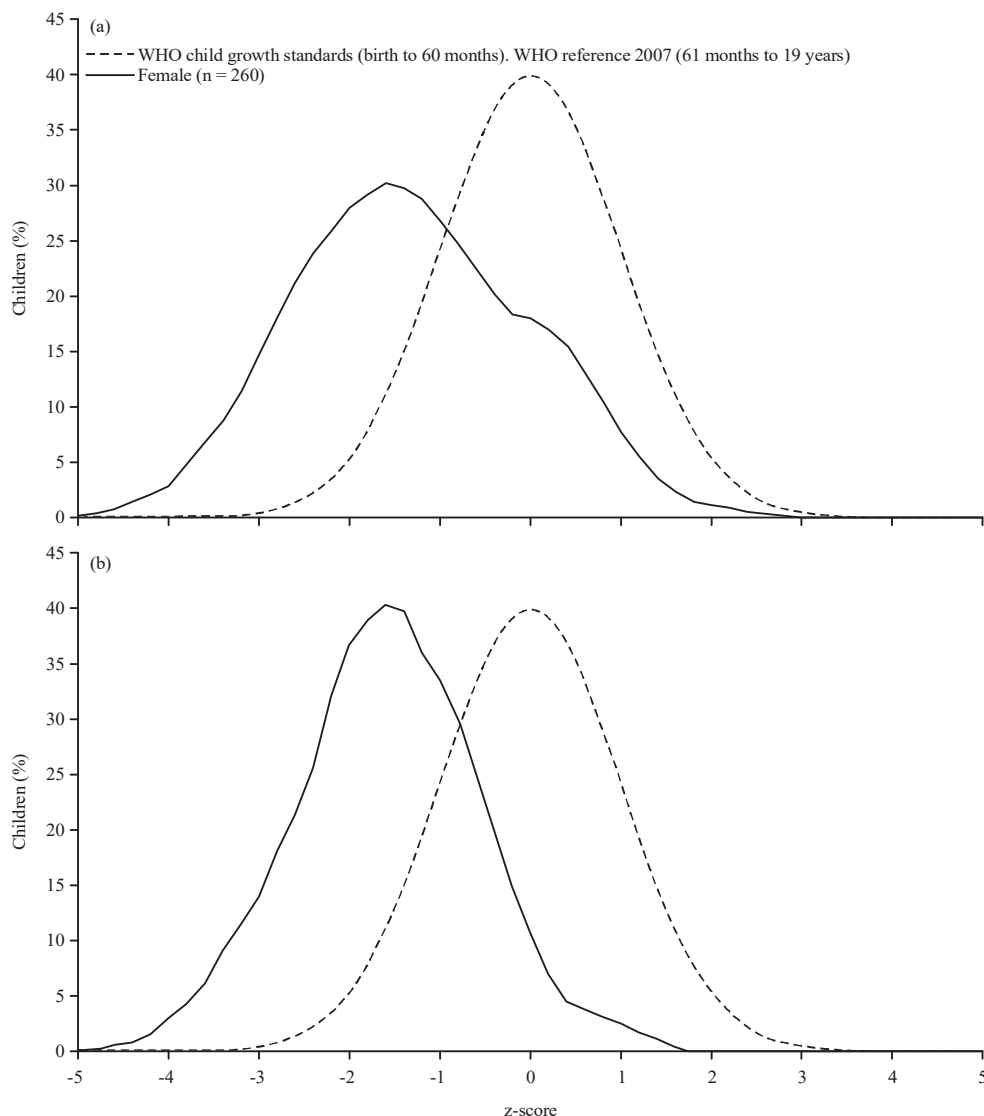


Fig. 1(a-b): Comparison between, (a) Height and (b) BMI for age of the subjects and WHO growth

Source: De Onis *et al.*<sup>14</sup>

Table 3: Age-wise distribution of subjects into different categories of nutritional status using BMI for age

Z scores	Classification	Years								Total (n = 260)	
		10 (n = 41)	11 (n = 31)	12 (n = 34)	13 (n = 46)	14 (n = 40)	15 (n = 24)	16 (n = 21)	17 (n = 23)		
>+ 2SD	Obesity									1 (4.3)	1 (0.4)
>+1SD to 2SD	Overweight	3 (7.3)			1 (2.2)	1 (2.5)		1 (4.8)			6 (2.3)
>-2SD to +1SD	Normal	24 (58.5)	22 (71.0)	18 (52.9)	31 (67.4)	29 (72.5)	17 (70.8)	17 (81.0)	17 (73.9)		175 (67.3)
<-2SD to -3SD	Thinness	10 (24.4)	5 (16.1)	10 (29.4)	8 (17.4)	7 (17.5)	7 (29.2)	3 (14.3)	4 (17.4)		54 (20.8)
<-3SD	Severe thinness	4 (9.8)	4 (12.9)	6 (17.6)	6 (13.0)	3 (7.5)		1 (4.3)	24 (9.2)		

Figures in parentheses ( ) denote percentage, Source: De Onis *et al.*<sup>14</sup>

the graph was peaked slightly higher than the standards graph but most of the subjects were placed below the median. Overall, the nutritional status of the subjects as determined by height for age and BMI for age exhibited that 30% of the subjects were stunted and thin.

**Morbidity profile:** The subjects were asked to report any ailment that they had experienced in one month prior to data collection. The morbidity data were collected in the months of October and November, 2014. About 46.2% of the subjects had stated to have suffered from common ailments (Table 4).

Table 4: Morbidity status of the subjects one month prior to data collection

Morbidity status	Subjects (%) (n = 260)
Suffered from common ailments	120 (46.2)
Did not suffer from common ailments	140 (53.8)
Types of common ailments	Subjects (%) (n = 120)
Fever	43 (35.8)
Cold and cough	29 (24.2)
diarrhoea	15 (12.5)
Skin problems	10 (8.3)
Eye problems	7 (5.8)
Fever, cold and diarrhoea	6 (5.0)
Hair problems	5 (4.2)
Body ache	3 (2.5)
Asthma	1 (0.8)
Toothache	1 (0.8)

Figures in parentheses () denote percentages

Table 5: Measures undertaken by the subjects for common ailments

Measures undertaken	Subjects (%) (n = 120)
Allopathic medicines	89 (74.2)
Home remedies	3 (2.5)
Faith healers and allopathic medicines	3 (2.5)
Ayurvedic medicines	2 (1.7)
Homeopathic medicines	2 (1.7)
No treatment availed	21 (17.5)

Figures in parentheses () denote percentages

Table 6: Source from where medicine was obtained

Sources	Subjects (%) (n = 99)
Allopathic practitioners	55 (55.6)
Medical shops	13 (13.1)
Government hospitals	12 (12.1)
Private hospitals	12 (12.1)
Home remedies	3 (3.0)
Homeopathy practitioners	2 (2.0)
Ayurvedic practitioners	2 (2.0)

Figures in parentheses () denote percentages

The most common illnesses faced by the subjects were fever, cold and cough, diarrhoea and skin problems included rashes and pimples. A few subjects had reported to have suffered from eye problems: vision defects, watering of eyes and itching of eyes, fever, cold and diarrhoea, hair problems (falling of hair and dandruff) and body ache. These problems are very common and seasonal and therefore, were reported by the subjects. Most of the subjects resorted to allopathic medicines for their treatment, while the rest used home remedies, ayurvedic medicines, homeopathic medicines and 3 subjects had gone to faith healers for their treatment (Table 5).

There were about 18% subjects who had received no treatment for their ailments. The most common line of treatment was allopathic medicine while a few of the subjects had faith in ayurvedic and homeopathic medicines, also. There were a few families who still believed in faith healers and that "jhadda" (Indian ritual of performing exorcism using a tool

made up of peacock feathers to ward off evil spirits) would cure a few diseases. Some of the subjects did not take any treatment because their mothers advised them that they would recover in due course of time and did not, therefore, needed any medicine. Allopathic medicines were obtained from allopathic practitioners (55.6%) running their own clinics in slums, medical shops (13.1%), government hospitals (12.1%) and private hospitals (12.1%) (Table 6). Ayurvedic and homeopathic medicines were obtained from ayurvedic and homeopathic practitioners. For home remedies, required substances were obtained from the home itself.

## DISCUSSION

The present study was conducted to assess the nutritional status and morbidity profile of school going girls residing in two slums of Jaipur city. In the present study, about one-third of the subjects were stunted and had thinness. The results of the present study were found to be concomitant with the previous researches conducted in Jaipur city as Goyle<sup>9</sup> demonstrated that 37% of the girls (n = 142, age = 10-15 years) from a low socioeconomic background in Jaipur city were stunted according to height for age criterion which was similar with the findings of the present study as 30% of the subjects were found to be stunted. In another study, 34% of girls (n = 100, age = 13-18 years) had thinness according to BMI for age residing in slums of Jaipur city<sup>7</sup>. The nutritional status of the subjects according to BMI for age in the present study showed that 30% of the girls had thinness. It can be inferred that the girls residing in slums of Jaipur city had poor nutritional status.

Even in other parts of Rajasthan, the prevalence of under nutrition among school going girls from poor socioeconomic background was quite high. About 55% and 40% of the girls (n = 129, age = 10-15 years) were underweight and stunted, respectively, in two villages of Jaipur District<sup>15</sup>. The data among school children (n = 1497, age = 5-15 years) from 24 villages of Jodhpur district demonstrated that stunting and underweight was 36.6% and 43.9%, respectively<sup>16</sup>. The prevalence of stunting was 46.9% among girls (n = 1497, age = 5-16 years) in Sirohi District and 59.3% of the girls had thinness<sup>17</sup>. In Bikaner District, the prevalence of underweight (based on BMI for age) in school children (n = 300, age = 6-12 years) was found to be 30.0%<sup>18</sup>. These findings support those of the present study where 30% of the school going girls were found to be undernourished, thereby, suggesting that school going girls belonging to deprived sections of the society in Rajasthan are malnourished to a great extent.

Table 7: Prevalence of stunting and thinness among girls in different slums of India

Place	Profile of girls	Growth standard used	Prevalence of stunting and thinness among girls	References
Moradabad-slum, Uttar Pradesh	n = 405, age = 10-19 years	WHO growth reference, 2007	Thinness-15.6%	Awasthi <i>et al.</i> <sup>19</sup>
Guwahati-slum, Assam	n = 400, age = 10-19 years	WHO growth reference, 2007	Stunting-29.0%, Thinness-20.0%	Deka <i>et al.</i> <sup>20</sup>
Hyderabad-slum, Andhra Pradesh	n = 394, age = 04-15 years	WHO growth reference, 2007	Stunting-17.0%	Syed and Rao <sup>21</sup>
Vishakhapatnam-slum, Andhra Pradesh	n = 100, age = 12-19 years	BMI < 18.5	Thinness-35.0%	Nagamani and Veni <sup>22</sup>
Hyderabad-slum, Andhra Pradesh	n = 196, age = 10-18 years	BMI < 18.5	Thinness-48.5%	Kumar <i>et al.</i> <sup>23</sup>
Kolkata-slum, West Bengal	n = 260, age = 14-16 years	WHO growth reference, 2007	Thinness-30.0%	Bhattacharyya <i>et al.</i> <sup>24</sup>
Dibrugarh town-slum, Assam	n = 284, age = 10-19 years	NCHS growth reference, WHO, 1995	Stunting-31.3%, Thinness-25.7%	Bhattacharyya and Barua <sup>25</sup>
Nalgonda-slum, Andhra Pradesh	n = 223, age = 10-18 years	NCHS growth reference, WHO, 1995	Stunting-47.0%, Thinness-42.6%	Prashant and Shaw <sup>26</sup>
Jaipur-slum, Rajasthan	n = 260, age = 10-17 years	WHO growth reference, 2007	Stunting-30.4%, Thinness-30.0%	Present study

The comparison of nutritional status of subjects in the present study with various studies on school going girls residing in slums of other cities in India is presented in Table 7. It can be seen from Table 7 that the range of stunting was from 17.0-47.0% and thinness was from 15.6-48.5%. The data of some of the studies were comparable with the findings of the present study as almost 30% of the subjects were stunted<sup>20,25</sup> as well as thin<sup>22,24,25</sup>. Therefore, it can be deduced that the prevalence of nutritional status as assessed by stunting and thinness was not at all satisfactory among girls residing in slums of Jaipur city.

In the present study, 50.0% of the subjects had reported suffering from some illnesses in one month prior to data collection and majority of them had reported to have suffered from fever (35.8%), cold and cough (24.2%) and diarrhea (12.5%). Hair problems and toothache were faced by 4.2% and only 0.8% of the subjects, respectively. Similar results were observed by different researchers in other parts of the India<sup>24,25,27-29</sup>. About 16% of the school going girls from Lucknow also reported that they were suffering from hair problems, followed by tooth and gum problems (14.2%), eye problems (11.7%) and cold and cough (6.9%)<sup>27</sup>. Charitha *et al.*<sup>28</sup> found that 50.0% of the girls (n = 243, age = 10-16 years) from an urban slum of Andhra Pradesh were suffering from one or more illnesses. Most of them reported tooth problems (18.3%), followed by skin infections (16.6%) and 10.6% were passing worms. The major prevalent morbid conditions among adolescent girls in Andhra Pradesh were skin problems (57.7%), ear, nose and throat problems (52.0%), dental problems (24.0%) and eye problems (5.7%)<sup>29</sup>. The study carried out amongst slum dwelling girls (n = 261, age = 10-19 years) of Dibrugarh town, Assam, also exhibited that various morbidities noticed amongst the girls were dental problems (42.3%), skin problems (20.1%) and diarrhea (7.4%)<sup>25</sup>. The results of another study conducted at Burdwan District of West Bengal, revealed that almost 88.0% of the girls were suffering from one or more illnesses<sup>24</sup>.

In the urban and rural areas of Bareilly District, the most common morbidities experienced by girls of low socio economic status and school children were cold and cough (38.6, 42.8%), skin infections (25.3, 24.3%) and diarrhea (16.8, 14.4%)<sup>30,31</sup>. In the present study, too, cold and cough (24.2%), diarrhea (12.5%) and skin problems (8.3%) were the common ailments suffered by the subjects.

The mode of procurement of medicine for treatment of disease in the present study was mainly from the private clinics of allopathic practitioners (55.6%). Very few subjects visited government hospitals (12.1%) or private hospitals (12.1%) for their treatment. Similar findings were observed in

different slums of India that the proportion of subjects who visited private medical services was higher than those visiting government medical services for the treatment of illnesses<sup>32-35</sup>.

### CONCLUSION

School going girls constitute an important segment of the population. Their health status influences the growth of the whole nation. The nutritional status of the school going girls in the present study was not at all satisfactory as 30% of the subjects were stunted and were thin as per WHO growth<sup>14</sup> Reference, 2007. The morbidity profile also reflected poor health as 50% of the subjects reported some form of illness in one month prior to data collection. The findings of the present study are quite alarming and steps need to be taken to improve their nutritional status.

### SIGNIFICANCE STATEMENT

This study discovered that the school going girls residing in the slum area of Jaipur city had poor nutritional status and morbidity profile. The monitoring of nutritional status of school children is very important for better future of the nation. These findings can be beneficial for the health policy makers and public health experts as it provides the baseline data of health status of girls residing in slums. This study will help the researcher to uncover the critical areas of nutritional status and morbidity profile of the girls and to plan different strategies for the targeted population. Thus a new theory on intervention approaches based on the data of their nutritional status may be arrived at.

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