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Composite Index of Anthropometric Failure Burden Among Hospitalized Pediatric Patients

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Abstract

Background: Conventional indicators like weight-for-age, height-for-age, and weight-for-height indicate different facets of nutritional status. The most common indicator is Weight-for-age. Weight-for-age as an indicator can be used independently, or in combination. Conventional indices fall short of portraying the full consequence of undernutrition in the population. Composite Index of Anthropometric Failure (CIAF) is another nutritional assessment tool which was created to solve this dilemma.

Aim of Study: This study was performed to compare the prevalence of undernutrition using CIAF and conventional indices.

Patients and Methods: 264 children were included with an age range of 1 to 193 months. They were recruited from inpatient service in the Children's Hospital. Ain Shams University, Cairo, Egypt. Weight and height measurements were obtained. Z-scores were calculated for weight-for-age (WAZ), height-for-age (HAZ) and weight-for-height (WHZ) using the anthropometric standards which are the ones recommended by the Centers for Disease Control and Prevention (CDC). Children were classified according to conventional indices as well as CIAF.

Results: The prevalence of moderate underweight, stunting and wasting was 9.85%, 10.89%, and 10.98% respectively and the prevalence of severe underweight, stunting and wasting was 25.76%, 20.45%, and 18.56% respectively. As per CIAF, 50.76% of children were malnourished. According to CIAF, approximately 33.3% of the undernourished children had a single anthropometric failure while less than 50% of them had dual failure and quarter of the malnourished had multiple failures. CIAF could recognise 15.15%, 19.32%, and 21.21% more undernourished children than those detected below -2 WAZ, HAZ, and WHZ respectively and 25%, 30.31%, and 32.2% more undernourished children than those detected below -3 WAZ, HAZ and WHZ correspondingly in contrast to conventional indices.

Conclusion: CIAF is seen to be superior over other conventional indices. CIAF is a useful index to assess the real magnitude of undernutrition and recognise children with multiple anthropometric failures. Since CIAF can recognise more undernourished children than conventional indices, it can be used as a handy tool for the detection of malnutrition especially in developing nations that suffer from a high prevalence of malnutrition.

Key Words: *Composite index – Anthropometric failure – Children.*

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Introduction

IN developing countries, millions of children are at risk of death due to severe acute malnutrition especially low and middle-income countries **[1]**. Malnutrition in Egypt imposes as a serious concern among the pediatric population. This is represented as 5.5% of children younger than five years old are underweight, 8.4% are wasted, and 21.4% are stunted. Malnutrition has a very high prevalence amidst ill children younger than five years of age. Therefore, it is a necessity to provide hospital-based and community based interventional nutrition programs for children to prevent the progression of the consequences of malnutrition **[2]**.

Establishing a baseline nutritional status at hospital admission for pediatric patients can significantly reduce hospital stay and expenses. In the underdeveloped countries, primary malnutrition is directly related to the low quality and quantity of diet and socioeconomic level. However, malnutrition is mainly due to chronic illness in more developed countries **[3]**.

Despite the lack of any actual numbers to indicate the prevalence of malnutrition among the hospitalised pediatric population; it is scientifically proven that malnutrition is intensely existent among them. Internationally, research shows that the incidence of malnutrition can be as high as 19% to 45.6% among hospitalised pediatric patients **[4]**. However, a cross-sectional study, was conducted on 500 under-three children who were admitted to the Children's Hospital Ain Shams University wards, illustrated that 62.4%, 58.4%, and 57.8% of the enrolled cases were underweight, stunted, and wasted, respectively [5].

The full burden of malnutrition cannot be explained by using each of the traditional indices of undernourishment independently like underweight, stunting and wasting. The reason behind that is that each one of these indices reflects a particular type of malnourishment. For example, stunting reveals chronic malnourishment; conversely, wasting designates acute malnourishment; however, underweight addresses both acute and chronic malnourishment, but fails to recognise stunted or wasted children who have proper weight regarding their age. From the tools used to estimate the real problem of malnutrition in children younger than five years old is the Composite Index of Anthropometric Failure (CIAF) which is gaining tremendous international popularity among nutrition experts. All three indices of malnutrition are assimilated in CIAF which provides a precise indication of the prevalence of malnutrition [6].

Peter Svedberg, a Swedish development economist, devised the first CIAF model in the year 2000. He integrated the three indices of malnourishment; stunting, wasting and underweight. He claimed that the use of a single traditional index of malnutrition does not adequately reflect the complete prevalence of malnutrition in paediatrics. That is because underweight (having low weight for age) is a product of stunting and wasting and not the sum. Consequently, he created CIAF [7].

Later on, a modification was brought on CIAF by Nandy et al., when CIAF was used on Indian statistics. It was assumed that this modified version was more effective than the traditional anthropometric indices for malnutrition; underweight, stunting, and wasting (Table 1). A study was later piloted to evaluate the superiority of CIAF in determining the true prevalence of malnutrition over the traditional anthropometric indices for malnutrition [8,9].

Table (1): Groups of anthropometric failure by CIAF.

Group	Description	Wasting	Stunting	Under-weight
A	No failure	No	No	No
B	Wasting only	Yes	No	No
C	Wasting and underweight	Yes	No	Yes
D	Wasting + stunting + underweight	Yes	Yes	Yes
E	Stunting and underweight	No	Yes	Yes
F	Stunting only	No	Yes	No
Y	Underweight only	No	No	Yes

CIAF = (1-a) / (a+b+c+d+e+f) (Nady and Svedberg, [11]).

Patients and Methods

Patients:

This was a prospective, interventional study conducted in the inpatient wards, Pediatrics hospital, Ain Shams University from May 2018 until September 2018.

The study included two hundred and sixty-four Egyptian children, screened at admission to the inpatient ward for undernourishment using CIAF.

Inclusion criteria:

- The child's age from birth to sixteen years old.
- Patients were not critically ill.
- Patients were admitted to the inpatient ward of the Children’s Hospital, Ain Shams University.

Exclusion criteria:

- Patients who cannot be weighed or plotted on percentiles.
- Patients admitted for less than 24 hours.
- Patients with conditions that markedly affected hydration or are clinically unstable.

Methods:

The sampling method used was a systematic random sampling of a specified sample size of a minimum number of 237 children was calculated based on malnutrition rates between 19% and 45.6% in hospitalised children [10].

Ethical considerations were addressed by obtaining verbal informed consent from caregivers before enrollment in the study according to the Faculty of Medicine, Ain Shams University Research Ethical committee.

All patients were subjected to the following:

1- Full medical history including current complaints and chronic diseases, allergies and/or genetic disorders.
2- Thorough clinical examination to ensure clinical stability of the patient.
3- Full anthropometric measures including weight and height. BMI and Z-scores were calculated as well (Weight for age Z-score, Height for age Z-score, Weight for height Z-score, and BMI Z-score).

Weight in Kg for children younger than two years: Weight was measured by digital baby and infant scale with the infants wearing the least possible clothes, reading was taken to the nearest (0.1) kg. The values were plotted on growth curves according to official 2010 centers for disease and control (CDC) growth charts, created by the National Center for Health Statistics (NCHS) Z score.

Weight in Kg for children older than two years: The child was weighed in light clothing without footwear. The values were plotted on growth curves according to official 2010 CDC growth charts, created by NCHS Z score.

Length in cm for children younger than two years: The child's length was measured lying down (recumbent) using a length board which was placed on a flat, stable surface such as a table. If a child would not lie down for measurement of length, standing height was measured, and 0.7cm was added to convert it to length. Percentages of medians were plotted on growth curves according to official 2010 CDC growth charts, created by NCHS and Z-scores.

Height in cm for children older than two years: Measured using a height board mounted at a right angle between a level floor and against a straight, vertical surface such as a wall or pillar, standing height was measured unless the child was unable to stand. Shoes and socks were removed beforehand. Percentages of medians were plotted on growth curves according to official 2010 CDC growth charts, created by NCHS and Z-scores.

Body mass index (BMI): Is the simplest parameters to assess nutritional status; BMI values were calculated using measured height and weight values as follows:

$$\text{BMI (Kg/m}^2\text{)} = \text{Weight} \div (\text{Height})^2$$

The anthropometric evaluation was done using methods adopted by the World Health Organization (WHO), anthropometric standards recommended by the Centers for Disease Control and Prevention (CDC), and using the Composite Index of Anthropometric failure (CIAF).

4- Laboratory investigations were done at admission and follow-up regularly including a complete blood count, serum albumin, total protein, total serum calcium, serum phosphate, alkaline phosphatase, alanine transaminase, blood urea nitrogen, and serum creatinine.

Results

264 patients were selected from the children admitted to the inpatient ward of the Pediatric Hospital, Ain Shams University. The sample included 165 male children (62.5%) and 99 female children (37.5%). The number of children in every age group was; 181 children less than 60 months in age (68.56%), 53 children between 60 and 120 months old (20.08%), and 30 children older than 120 months (11.36%). They were all screened using CIAF. Table (2) describes the prevalence of underweight, stunting and wasting among different age groups and gender. The study sample showed a 35.61% underweight, 31.34% stunting and 29.54% wasting.

Table (3) describes the distribution of different CIAF groups among the sample according to gender and age groups. CIAF was highest among children younger than 60 months (53.59%) and females (51.52%).

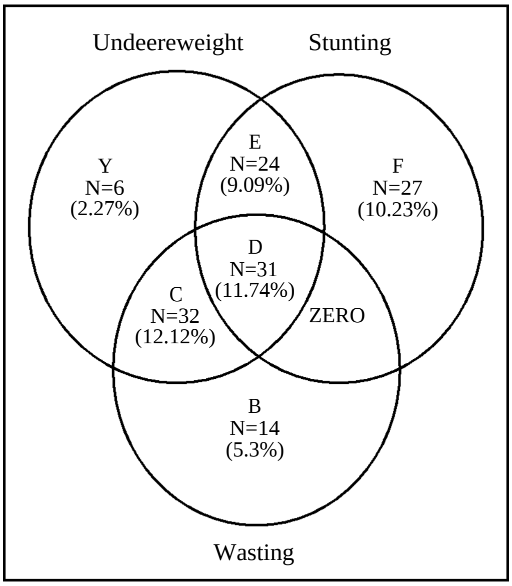
Fig. (1) describe the distribution of the 134 children who showed undernourishment among different CIAF categories; 14 children showed wasting only (5.3%), 32 children showed underweight and wasting (12.12%), 31 children showed underweight, stunting and wasting (11.74%), 24 children showed underweight and stunting (9.09%), 27 children showed stunting only (10.23%) and finally 6 children showed underweight only (2.27%).

Table (2): The distribution of WAZ, HAZ, and WHZ among different age groups and gender (N=264).

Indicator	Classification	Age in months			Gender		Total
		<60	60-120	>120	Male	Female	N (%)
		N (%)	N (%)	N (%)	N (%)	N (%)	
WAZ (Underweight)	Normal	109 (60.22	39 (73.58)	22 (73.33)	107 (64.85)	63 (63.64)	170 (64.39)
	Moderate	23 (12.71)	2 (3.77)	1 (3.33)	12 (7.27)	14 (14.14)	26 (9.85)
	Severe	49 (27.07)	12 (22.64)	7 (23.33)	46 (27.88)	22 (22.22)	68 (25.76)
	X 2		6.728			3.747	
	p		0.151			0.154	
HAZ (Stunting)	Normal	120 (66.30)	37 (69.81)	24 (80.00)	112 (67.88)	69 (69.70)	181 (68.56)
	Moderate	19 (10.50)	6 (11.32)	4 (13.33)	19 (11.52)	10 (10.10)	29 (10.89)
	Severe	42 (23.20)	10 (18.87)	2 (6.67)	34 (20.61)	20 (20.20)	54 (20.45)
	X 2		4.438			0.147	
	p		0.350			0.929	
WHZ (wasting)	Normal	124 (68.51)	43 (81.13)	19 (63.33)	114 (69.09)	72 (72.73)	186 (70.45)
	Moderate	19 (10.50)	5 (9.43)	5 (16.67)	19 (11.52)	10 (10.10)	29 (10.98)
	Severe	38 (20.99)	5 (9.43)	6 (20.00)	32 (19.39)	17 (17.17)	49 (18.56)
	X 2		5.197			0.393	
	p		0.268			0.821	

Table (3): Prevalence of CIAF groups among the sample according to age groups and gender (N=264).

Group	Description of the group	Age in months			Gender		Total
		<60	60-120	>120	Male	Female	N (%)
		N (%)	N (%)	N (%)	N (%)	N (%)	
A	No failure	84 (46.41)	30 (56.60)	16 (53.330	82 (49.70)	48 (48.48)	130 (49.24)
B	Wasting only	7 (3.87)	3 (5.66)	4 (13.33)	9 (5.45)	5 (5.05)	14 (5.30)
C	Wasting and underweight	25 (13.81)	3 (5.66)	4 (13.33)	19 (11.52)	13 (13.13)	32 (12.12)
D	Wasting + stunting + underweight	25 (13.81)	3 (5.66)	3 (10.00)	22 (13.33)	9 (9.09)	31 (11.74)
E	Stunting and underweight	17 (9.39)	6 (11.32)	1 (3.33)	15 (9.09)	9 (9.09)	24 (9.09)
F	Stunting only	18 (9.94)	7 (13.21)	2 (6.67)	16 (9.70)	11 (11.11)	27 (10.23)
Y	Underweight only	5 (2.76)	1 (1.89)	0 (0.00)	2 (1.21)	4 (4.04)	6 (2.27)
	Total (B+C+D+E+F+Y)	97 (53.59)	23 (43.40)	14 (46.67)	83 (50.30)	51 (51.52)	134 (50.76)
	X^2		13.196		3.418		
	p		0.355		0.755		



Screening (N=264)

Fig. (1): Prevalence of CIAF groups.

Discussion

Malnutrition continues to pose a significant problem in Egypt despite the immense efforts to provide nutritional support to deal with malnutrition in the last years. Many studies recently tackled the numerous issues of malnutrition in young children from Egypt **[2]**. This attention to malnutrition developed after recognizing that almost 50% of the mortality in young children is attributable to malnutrition which is nearly 3 million children per year **[12]**.

Moreover, malnutrition among hospitalized children poses a great impediment to clinical improvement and causes a significant delay in physical and mental development. The prevalence of malnutrition is as high as 12-24% among hospitalized children **[13]**.

Malnutrition is portrayed through three traditional indices. Stunting is defined as having low height for age Z-score, wasting is having low weight for height Z-score and underweight is having low weight for age Z-score. Peter Svedberg created a screening tool that combined the three traditional indices to form six new groups and later a seventh group was added by Nandy et al., This new tool was called CIAF and was able to detect the overall burden of malnutrition better than the individual traditional indices **[9]**.

Therefore, it was found essential to study the prevalence of malnutrition among clinically stable hospitalized pediatric patients to address the malnourishment issue. In this study, 264 patients were selected from the children admitted to the inpatient ward of the Pediatric Hospital, Ain Shams University.

At screening, males showed a significantly lower mean WAZ-score (–2.340±3.549) than that in females (–1.411±2.281). Similarly, a study conducted in west Bengal, India reported that males had a lower mean WAZ (–1.80±0.85) than females (–1.78±0.95) **[14]**. On the contrary, a study conducted in Fayoum, Egypt reported that males had a higher mean WAZ (–0.35±1.55) than females (–0.72±1.64) **[2]**.

Also, mean HAZ-score among males (–1.636±2.719) was lower than that in females (–0.991 ± 2.203). Likewise, in west Bengal mean HAZ-score among males (-1.54±1.03) was lower than that in females (–1.42±1.13) (Acharya et al., 2013). However, in Fayoum, Egypt, males had a higher mean HAZ (–0.63±1.19) than females (–1.20±1.37) **[2]**.

The lower mean WAZ and HAZ in males can be attributable to the increased activity level in boys compared to girls that eventually leads to a higher energy shortfall. This explains the higher energy and caloric requirements in males. Besides, the lack of gender bias in urban cities leads to the former results [14]. While the higher mean WAZ and HAZ in males in the study conducted in Fayoum can be due to gender bias practiced in rural regions and giving more care and better nutrition to males than females.

By using the conventional indices of malnutrition, the sample showed 29.54% wasting, similarly according to Rasheed and Jeyakumar the prevalence of wasting was 29% [15]. Likewise, in a study conducted in the urban slums of Bandra, India, the prevalence of wasting was 24.7% [16] and in Puducherry, the prevalence of wasting was 37.9% [17]. Also, in Yemen, wasting was as high as 39.9% [12]. However, other studies in Egypt showed different results,the prevalence of wasting in Alexandria, was only 3.6% [18], in Beni-Suef, was 17% [19] and in Fayoum was 19.3% [2].

As for stunting, the sample showed a 31.34% stunting. Similar results were documented in India, with a 36.4% in the urban slums of Bandra [16], 30.7% stunting in west Bengal results [14]. Also, in Yemen, the prevalence of stunting was 38.5% [12]. Nevertheless, in Egypt contrasting prevalence of stunting was documented. In Fayoum, the prevalence of stunting was 18.5% [2], while in Alexandria, only 15% suffered from stunting [18], and finally in Beni-suef, only 16.6% suffered from stunting [19].

Concerning underweight, it was present in 35.61% of the study sample. Similarly, in India, a 34% were underweight in Pune district [15], 39.7% were recorded in the urban slums of Bandra [16] and 37.9% in Puducherry [17]. On the contrary, in Fayoum, underweight showed a lower prevalence of 23.2% [2] as well as in Beni-suef, underweight was recorded as 17.9% [19] and in Alexandria, underweight was found to be 7.3% [18].

The lower prevalence of the three indices of malnutrition among studies conducted in Egypt can be attributable to the difference in the nature of the sample, as these study samples did not contain children suffering from chronic disease states or conditions that required hospitalization unlike our study. Also, the studies conducted in Fayoum, Alexandria and Beni-Suef contained children from a homogenous demographic and socioeconomic standard in contrast to our study sample that contained children from various places from all over Egypt.

When considering different CIAF groups among the sample, group A (no failure) included 49.24%. Similarly, in India, group A included 42.7% in west Bengal [14], 42% in the urban slums of Bandra [16], 41.41% in Nagpur [20] and 51.3% in Puducherry [17]. On the other hand, in Yemen, group A included only 29.9% [12].

As for group B, which portrayed wasting only included 5.3%. Correspondingly, Indian studies showed similar prevalence of group B. In west Bengal, the prevalence of group B was 0.9% (Acharya et al., 2013), 3% in Bandra [16], 2.73% in Nagpur [20], and 6.4% in Puducherry [17]. Yet, in Yemen a higher percentage was reported for group B (10.4%) [12].

Furthermore, group C which represents wasting and underweight included 12.12%. Likewise, a percentage of 15% was reported in Bandra [16], 18.7% in Puducherry [17], and 15.3% in Yemen [12]. On the other hand, in west Bengal, a percentage of 5.8% was recorded [14], and 8.2% in Nagpur [20].

Group D, represents wasting, stunting and underweight altogether. It represented 11.74% of the sample. Similar prevalence was documented only in Yemen (14.3%) [12]. Other studies showed lower prevalence of group D, as in west Bengal (5.3%) [14], Bandra (6%) [16], Nagpur (4.3%) [20], and Puducherry (8.6%) Puducherry [17].

Moreover, group E denotes stunting and underweight, it included 9.09%. In a study conducted in Puducherry, there was a comparable prevalence of group E (6.1 %) [17] as well as a study in Malawi which reported a 9.6% [21]. Yet, all older studies showed a higher prevalence of group E, in west Bengal it was reported as 18.7% [14], in Bandra group E was 15% [16], in Nagpur it was 19.92% [20], and in Yemen it was 19.6% [12].

When taking a look to group F which reflects stunting, it is found to represent 10.23% of the sample. A close prevalence was reported in Nagpur (10.55%) [20] and Bandra (15%) [16], while lower prevalence was reported in west Bengal (6.7%) [14], Puducherry (4.4%) [17] and Yemen (4.6%) [12].

Finally, group Y which represents underweight showed a prevalence of 2.27%. Other studies showed similar prevalence of group Y, 3% in Bandra [16], 4.5% in Puducherry [17] and 5.9% in Yemen [12]. However, a higher prevalence was reported in west Bengal (12.9%) (Acharya et al., 2013), and Nagpur (33%) [20].

The difference in distribution between CIAF groups among the former studies is the aftermath of the demographic differences, political disputes that may affect the availability of food and water, and differences in dietary habits between countries.

Anthropometric failure among the sample was recorded as 50.76 % using CIAF. Similar CIAF percentages were reported in a multitude of studies as follows; 49% [17], 50.2% [14], 58.59% (Dhok and Thakre, 2016). On other hand, it was reported higher values in other studies as follow; 70% (Al-Sadeeq et al., 2018), 75% [15]. The higher values can be attributed to war condition in Yemen and poverty at certain districts in India.

Furthermore, CIAF among girls (51.52%) was higher than boys (50.3%) which was consistent with the study conducted in Yemen that showed a CIAF percentage among girls of 70% while among boys was 69.8% [12]. The higher prevalence of CIAF among girls can be a result of gender bias and giving more attention and nurturing to male kids.

In addition, CIAF prevalence among different age groups showed a higher percentage (53.59%) among children younger than 60 months when compared to those aged 60 to 120 months (43.4%) and those older than 120 months (46.67%). However, Ramkumar et al., reported that the prevalence of undernutrition increased with age among this study sample, with the highest prevalence among children older than 132 months and younger than 158 months (98.4%) [17].

Conclusion:

CIAF was able to detect a 50.76% malnourishment among the sample which was higher than any of the conventional indices.

Prevalence of malnutrition, according to CIAF, was 50.3% among boys and 51.5% among girls who were hospitalized in Ain Shams University Children's Hospital. Additionally, it was most pronounced in the under 60 months of age.

The economic burden of pediatric malnutrition was described by the World Food Program (WFP) in 2009 as an estimate of 20.3 billion Egyptian pounds or a 1.9% of Gross Domestic Product (GDP). Also, the compromised nutritional status of pediatric patients leads to a longer hospital stay and inferior clinical outcomes. This economic burden highlighted the importance of nutritional screening of hospitalized infants and childrenfor prompt nutritional rehabilitation therapy with special emphasis on girls below 60 months of age.

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عبء فشل المؤشر التراكمى للقياسات الجسمانية بين مرضى الأطفال بالمستشفى

الخلفية: لايزا سوء التغذية يمثل مشكلة كبير فى مصر على الرغم من الجهود الهائلة لتوفير الدعم الغذائى للتعامل مع سوء التغذية فى السنوات الأخيرة. علاوة على ذلك، يشكل سوء التغذية بين الأطفال فى المستشفيات عائقاً كبيراً للتحسن السريرى ويؤدى إلى تأخير كبير فى النمو البدنى والعقلى. معدل انتشار سوء التغذية يصل إلى ١٢–٢٤٪ بين الأطفال فى المستشفى.

الأهداف: تشير المؤشر التقليدية مثل الوزن مقابل العمر والطول مقابل العمر والوزن مقابل الطول إلى الحقائق مختلفة عن الوضع الغذائى. المؤشر الأكثر شيوعاً هو الوزن مقابل العمر، سواء تم استخدامه بشكل مستقل أو كجزء من مجموعة المؤشرات التقليدية وقد لا يكون كافياً للتعبير عن النتيجة الكاملة لسوء التغذية لدى السكان. المؤشر التراكمى للفشل القياسات الجسمانية هو أداة أخرى لتقييم وضع التغذية وقد كان نتاجا للجهود المبذولة لحل هذه المعضلة.

طرق البحث: لذلك، أجرينا هذه الدراسة بهدف مقارنة انتشار سوء التغذية تبعا للمؤشرات التقليدية والمؤشر التراكمى لفشل القياسات الجسمانية. شلمنا ٢٦٤ طفلاً تتراوح أعمارهم بين ١و ١٩٣شهراً من المرضى المحجوزين داخل قسم الأطفال بجامعة عين شمس والواقعة بالقاهرة، مصر. تم الحصول على قياسات الوزن والطول ومن ثم تم حساب الفارق المعيارى عن متوسط القيمة للوزن مقابل العمر والطول مقابل العمر والوزن مقابل الطول بإستخدام المعايير البشرية الأنثروبومترية التى أوصت بها مراكز السيطرة على الأمراض والوقاية منها.

النتائج: وقد تم تصنيف الأطفال وفقاً للمؤشرات التقليدية وقد كان معدل إنتشار نقص الوزن والتقزم والهزال من الدرجة المتوسطة٩.٨٥٪و١٠.٨٩٪ و ١٠.٨٩٪ على التوالى، وكان معدل انتشار نقص الوزن والتقزم والهزال من الدرجة الحادة ٢٥.٧٦٪ و٢٠.٤٥٪ و١٨.٥٦٪ على التوالى. وقد كان ٥٠.٧٦٪ من الأطفال مصابين بسوء التغذية تبعاً للمؤشر التراكمى لفشل القياسات الجسمانية.

ووفقاً للمؤشر التراكمى لفشل القياسات الجسمانى، يعانى حوالى ٣٣.٣٪ من الأطفال المصابين بسوء التغذية من عيب واحد فى المؤشرات التقليدية الثلاث بينما أقل من ٥٠٪ منهم مصابون بفشل مزدوج. وربع المصابين بسوء التغذية يعانون من إخفاقات متعددة فى المؤشرات التقليدية الثلاث السابقة ذكرها.

المؤشر التراكمى لفشل القياسات الجسمانية يمكنه التعرف أكثر على الأطفال الذين يعانون من سوء التغذية بالمقارنة بالأطفال التى تكون أقل من الفارق المعيارى –٢ عن متوسط القيمة للوزن مقابل العمر والطول مقابل العمر والوزن مقابل الطول بمقدار ١٥.١٥٪ و ١٩.٣٢٪ و٢١.٢١٪ على التوالى. وبالمقارنة بالأطفال التى تكون أقل من الفارق المعيارى–٣ عن متوسط القيمة للوزن مقابل العمر والطول مقابل العمر والوزن مقابل الطول يمكنه التعرف على سوء التغذية بفارق ٢٥٪ و ٣٠.٣١٪ و ٣٢.٢٪ على التوالى. ولذلك ينظر إلى المؤشر التراكمى لفشل القياسات الجسمانية على أنه متفوق على المؤشرات التقليدية الأخرى.

الأستنتجات: علاوة على ذلك، يمكن لمؤشر التراكمى لفشل المركبات الجسمانية تحديدا للأطفال الذين يعانون من سوء التغذية أكثر من المؤشرات التقليدية. وبالتالى، فإنه أداة مفيدة.