

Human Development and related Components with Malnutrition in Children: a Global Ecological Study

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Abstract

Background: It is necessary to achieve information on malnutrition situation in children for resource allocation and health policy making, therefore this study aimed to identify the role of human development and its components on malnutrition situation in children under-five years of old worldwide.

Materials and Methods: This ecological study was performed on the relation of the malnutrition situation of children under 5 years of old and human development index (HDI). Data about the HDI and its components were obtained for 188 countries from the United Nations Development Programme (UNDP) database and Data about prevalence of wasting, stunting and overweight in children under 5 in 2014 for 121 countries were obtained from World Health Organization (WHO). Correlation bivariate method was used to evaluate correlation between the prevalence of malnutrition status and the HDI.

Results: Globally mean prevalence of stunting, wasting and overweight were 23.4 (21- 25.7), 6.2 (5.4- 7) and 7.1 (6.3- 8) percent respectively. There was a negative statistically significant correlation between prevalence of stunting and wasting with HDI and its components, physician per population, maternal mortality rate ($P<0.001$); while positive significant correlations were observed between prevalence of overweight and HDI and its components ($P<0.05$).

Conclusion: Stunting and wasting were common in low developed regions, while overweight mainly is a health problem in high development regions. HDI and its components can change the prevalence of malnutrition aspects across countries. Developed and developing countries need to provide more health education and preventive interventions about malnutrition in under- five children.

Key Words: Children, Human Development Index, Malnutrition, Overweighting, Stunting, Wasting.

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1- INTRODUCTION

Nutrition plays a vital role in the community. During nutritional emergencies such as drought or famine, the first relief priority is the provision of food to the community and disease prevention through prompt attention to nutrition and various aspects of environmental health (1). Malnutrition is a leading cause of childhood deaths in low- and middle-income countries (2), particularly during the first 5 years of life (3). Globally, children with moderate and severe acute malnutrition are approximately 60 million and 13 million respectively (4). Between 8 to 11 million under-five children die each year worldwide (3). While more than 35% of these deaths are attributed to malnutrition, which are mostly preventable through economic development and public health measures (5).

Malnutrition among children is a serious problem, because its effects are long lasting and go beyond childhood. It has both short and long term consequences. For example, undernourished as compared to non-undernourished children are physically, emotionally and intellectually less productive and suffer more from chronic illnesses and disabilities (6). Malnutrition includes various forms, such as: wasting, stunting and underweight (7, 8) The terms wasting and stunting are used to differentiate, among under-weight children, those who had a low weight in relation to their height (wasted) from those who were small for their age (stunted) (9). The majority of studies on child nutritional status have described prevalence of malnutrition among under-five children and analyzed socio-economic, demographic and cultural factors associated with child malnutrition (10); in addition, other factors such as life expectancy, education level, income level and access to healthcare are associated with malnutrition that this relationship has

been demonstrated in some studies (11, 12). Human Development Index (HDI) as a key socio-economic determinant of health is composed of three components including: education, life expectancy and gross national income (13), however, little is known about the links between child's nutritional status and HDI. It is necessary to get information on nutrition situation in children and epidemiology of the malnutrition to use for planning and further research. This study aimed to identify the role of human development in the nutrition situation of children under-five years of old worldwide.

2- MATERIALS AND METHODS

This ecological study was performed on the relation of the nutrition situation of children under 5 years of old and HDI. HDI has several main components including life expectancy at birth, mean years of schooling, expected years of schooling and GNI per capita; Data about the HDI and other indices were obtained for 188 countries from the UNDP database (14). We used the predefined categories of the distribution of HDI by country: low ($HDI < 0.55$), medium ($0.55 \leq HDI < 0.69$), high ($0.7 \leq HDI < 0.79$), and very high ($HDI \geq 0.8$) (15).

Data about prevalence of wasting, stunting and overweight in children under 5 (%) in 2014 for 121 countries, were obtained from World Health Organization center (16). Data analysis was restricted to 121 countries that both the epidemiologic data from the prevalence of nutrition status in children under 5 years and the HDI were available. These countries categorized into four categories including: (1) Very High Human Development (11 countries), (2) High Human Development (36 countries), (3) Medium Human Development (44 countries) and (4) Low Human Development (40 countries). In this study, one way ANOVA were used to compare mean prevalence of wasting, stunting and

overweight according HDI categorize. We also, used the correlation bivariate method for assessment of the correlation between the prevalence of nutrition status in children under 5 years and the HDI. The significance level of 0.05 was considered. Data were analyzed by Stata computer software version 12 (StataCorp, College Station, TX, USA).

3- RESULTS

Globally mean prevalence of stunting, wasting and overweight were 23.4 (21-25.7), 6.2 (5.4- 7) and 7.1 (6.3- 8) percent respectively. **Table.1** as well as **Figure.1** shows nutrition status in children under-five year according by HDI regions. The highest mean prevalence of stunting (F=71, df= 126, P<0.001) and wasting (F=11.9, df= 126, P<0.001) were seen in

low developed regions; while highest mean prevalence of overweight belonged to high development regions (F=12.85, df= 126, P<0.001). These difference for mean prevalence of nutrition status among children under 5 year in different HDI regions were significant (P<0.05).

Table.2 shows the correlations between nutrition status among children under 5 year and health related variables. There was a negative significant correlation between prevalence of stunting and wasting with HDI, life expectancy at birth, mean year of schooling, physician per population, maternal mortality rate (MMR) and gross national income (P<0.001); while theses correlations between Prevalence of overweight and mentioned variables except Gross national income were significantly positive (P<0.05).

Table-1: Nutrition status among children under 5 year in different HDI regions in 2014

Index	Low Human Development	Medium Human Development	High Human Development	Very High Human Development	F	P-value
Prevalence of stunting	35.7±8.3	26.1±10.2	12.7±6.35	6.5±5.3	71	<0.001
Prevalence of wasting	9 ±5.15	6.4±3.9	4.1±3.7	2.5±3.2	11.92	<0.001
Prevalence of overweight	4.5±2.85	6.5±4.1	10.45±5.2	8.4±5.3	12.85	<0.001

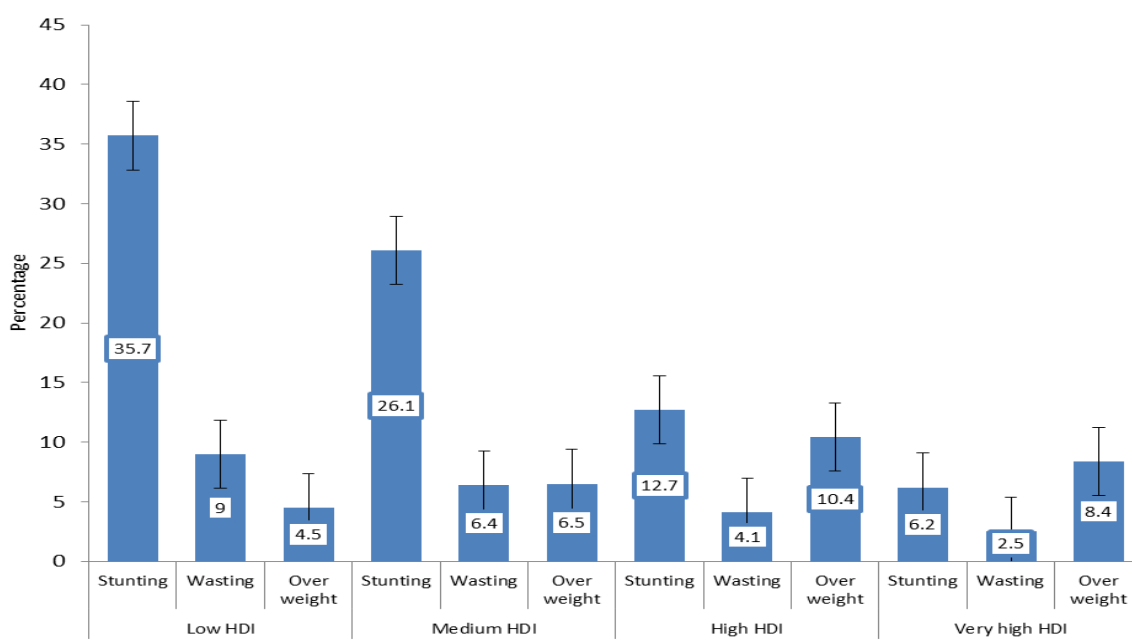


Fig.1: Nutrition status among children under 5 year according different HDI regions in 2014

Table-2: The correlations between nutrition status among children under 5 year and some health related variables

Variables	HDI	Life expectancy	Mean year of schooling	Physician per 1000 population	Maternal mortality	Gross national income
Prevalence of stunting	-0.8	-0.67	-0.74	-0.62	0.64	-0.52
<i>P</i> -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Prevalence of wasting	-0.5	-0.4	-0.49	-0.42	0.4	-0.3
<i>P</i> -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Prevalence of overweight	0.45	0.36	0.47	0.44	-0.43	0.16
<i>P</i> -value	<0.001	<0.001	<0.001	<0.001	<0.001	0.07

4- DISCUSSION

In this study, the nutritional status of children under age 5 in the world according to HDI was studied; as well as, relationship between HDI components, some health indicators and nutritional status of these children analyzed. According to the results of this study, highest prevalence rate of stunting and wasting significantly was observed in areas with low HDI; and on the other hand, areas with high HDI had the highest prevalence of overweight. Similar results have been obtained in other studies in which the relationship between HDI and nutritional status of children has been surveyed (11, 12). Stunting is deficiency for calories and protein available to the body tissues and it is inadequate intake of food over a long period of time, or persistent and recurrent ill-health. This index (stunting) is less sensitive to temporary food shortages and thus seems to be considered as the most reliable indicator. Because studies have shown that wasting is volatile over seasons and periods of sickness and underweight shows seasonal weight recovery and being overweight for some children can also affect weight-for-age index. Wasting or acute protein-energy malnutrition captures the failure to receive adequate nutrition during the period immediately before the

survey, resulting from recent episodes of illness and diarrhea in particular or from acute food shortage (17). Regional differences in health indicators are explained not only by individual and behavioral factors, but also, by the social and environmental characteristics of communities; including levels of social capital and cohesion, enough food, access to health services, access to green blue spaces and environmental pollutants (18). All these factors may have effect on the nutritional status, especially in children; countries with low HDI usually associated with these factors have adverse and permanent conditions, which will subsequently affect nutritional status.

The prevalence of overweight among children has become a well-recognized public health problem in developed countries (19). To explain the high prevalence of overweight in regions with high and medium HDI it can be noted that countries that fall into this category are in transition towards industrialization; this transition affects all aspects of people's lives including health-related aspects such as: lifestyle, agriculture and diet; this despite the fact that all of these factors are involved in determine the nutritional status. Another reason that can be cited is that the improvement economic situation

in these countries has been associated with increasing access to high-calorie foods, but may be due to non-compliance with a healthy and balanced diet, and certain nutritional behaviors; intake of high-calorie foods has been increasing. According to the results, there was a negative significant correlation between prevalence of stunting and wasting with HDI, its components, physician per population and MMR. While these correlations between prevalence of overweight and mentioned variables were significantly positive. Negative correlation between prevalence of stunting and wasting with components of HDI has been shown in other studies (11, 12).

Life expectancy, as one of the most important indicators of health, differs widely between countries and regions, and it is affected by many other health indicators, especially indicators of nutritional status (20). As a result, improving health indices increased life expectancy subsequent malnutrition (stunting and wasting) rates will be reduced. Increasing mean years of schooling will also, increase the level of health literacy; in previous studies the role of health literacy has been proven in reducing high-risk behaviors such as nutritional behaviors, smoking, alcohol consumption and poor lifestyle, which cause the health disorders. On the other hand, illiterate people pay more attention to health messages and will follow healthy programs (21). Increasing the education level of mothers, as direct feed other family members, especially children, has an important role in the prevention of malnutrition. In fact, education could make a difference by empowering mothers (decision on type of nutrition and/or use of preventive medicine). Similar results have been found in other studies worldwide have been obtained (2, 7).

Income is another factor that affects the change in lifestyle, particularly nutritional status. Results of other studies have shown

that people with low incomes, consume more tobacco and alcohol; and eat fewer fruits and vegetables than those with higher incomes (22). Poor nutritional status and low intake of fresh fruits and vegetables will lead to malnutrition. The relationship between health indicators such as: MMR, the ratio of physicians to population and nutritional status of the population in many studies around the world, as present study, has been shown (23, 24). MMR as one of the most important indicators of health in each country represents the development of health care and access to them. As a result, increasing MMR can indicate adverse health status that nutritional status in children will be affected. On the other hand, sufficient number of physicians to population will provide favorable conditions; such as providing education on healthy nutrition, appropriate medical care, early detection and removal of growth disorders in children, etc. So, all these factors will lead to the promotion and improvement of the nutritional status among children.

4-1. Limitations of the study

One limitation of this study is impossible to generalize the results to small communities; it is recommended that similar studies be done at the national level and smaller communities in different countries. It also, recommended that in future studies, other aspects related to nutrition status to be surveyed.

5. CONCLUSION

Malnutrition is a serious public health problem among children around the world. Stunting and wasting were common in low developed regions, while overweight mainly is a health problem in high development regions. Countries that fall into category of high HDI are in transition towards industrialization; this transition affects all aspects of people's lives including health-related aspects such as:

lifestyle, agriculture and diet. Higher prevalence of overweight in these countries compared to very high HDI countries implies that in these countries still has not been modified eating patterns. Thus these countries having the greatest risk of diseases associated with overweight and obesity. HDI and its components can change the prevalence of malnutrition aspects across countries. Developed and developing countries need to provide more health education and preventive interventions about malnutrition in under-five children.

6- CONFLICT OF INTEREST: None.

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