



Factors Responsible for Childhood Malnutrition: A Review of The Literature

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Abstract

Children are the future of any nation. A malnourished child is not only a problem of present-day society, but also an issue for the future. However, approximately one-third of the world's children are malnourished. Malnourishment can be measured in terms of nutrition and weight. In general, people believe that a lack of money—that is, financial poverty—is the main reason for childhood malnutrition. Nevertheless, most studies addressing this topic report that socio-economic factors are the major cause of childhood malnutrition worldwide. This study analyses how some of these socio-economic factors affect childhood malnutrition and identifies the major steps taken by the authorities of different countries to eliminate these causes. A review of the literature shows that a mother's knowledge of her children's health, her education level, and her place of residence are some of the major factors impacting children's nutrition level. A literature review shows that among all types of malnutrition measurements, stunting indicates the long-term impact of consistent malnutrition most effectively. The governments of several countries as well as international organisations are trying to overcome this problem through the implementation of various programs; however, more thorough intervention is required.



Article History

Received: 27 January 2020

Accepted: 18 June 2020

Keywords

Child;
Education;
Employment;
Malnutrition;
Poverty;
Stunting.

Introduction


The imbalance between the nutrients the body needs and the nutrients it receives is known as malnutrition, which may take the form of either undernutrition or obesity.¹ According to the definitions provided by the World Health Organization (2010),² undernutrition can be one of two types: protein

energy malnutrition or micro nutrient deficiency. Protein energy malnutrition manifests early during the ages of 6 months–2 years, resulting from irregular or no breastfeeding, introduction to low protein food, and different types of infections (FAO, 2004).³ It is measured by indicators such as wasting, stunting, being underweight, or obesity.

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Doi: <http://dx.doi.org/10.12944/CRNFSJ.8.2.01>

Wasting is defined as the failure to receive adequate nutrition in the period immediately preceding the survey. It may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition. Children whose weight-for-height (WAZ) is below minus three standard deviations (-3 SD) from the median of the reference population are considered to be severely wasted, and those below minus two standard deviations (-2 SD) are classified as wasted. The height-for-age (HAZ) index is an indicator of linear growth retardation and cumulative growth deficits. Children whose HAZ Z-scores are below minus two standard deviations from the median of the reference population are considered short for their age, or stunted, and are chronically malnourished. Similarly, when this Z score is less than minus three of the standard deviation, the child is classified as severely stunted (WHO, 2010).² Stunting reflects a failure to receive adequate nutrition over a long period, which is affected by recurrent and chronic illness. Weight-for-age is a composite index of HAZ and WAZ. It takes into account both acute and chronic malnutrition. Children whose weight-for-age is below minus two standard deviations from the median of the reference population are classified as underweight. Stunting is normally considered the most important measure when evaluating malnutrition among children; hence, this study focuses on HAZ categories. The measurement of the related z scores is calculated based on the reference population and its median. On the other end of the spectrum, excessive fat deposition in the body can lead to being overweight or obese. According to the World Health Organization (WHO), proper weight is measured by body mass index (BMI), which is the WAZ. When the value of a child's BMI is 25 or more, the child is classified as overweight. When the BMI is greater than or equal to 30, the child is considered obese. Normally, BMI has been measured using specific software such as ANTHRO, provided by the World Health Organization since 2006.

Materials and Methods

This study is based on a systematic review of published articles in different online databases including: (i) Scopus, (ii) Elsevier, and (iii) Web of Science. Search engines utilised were Google Scholar, INFLIBNET, and JSTOR. The period of publication for the reviewed articles was from 1990

to 2019. The articles were chosen for review based on a search of relevant topics, including: childhood malnutrition and socioeconomic factors, the relation between childhood malnutrition and the mother's health and education, and the reasons behind childhood obesity.

The discussion is divided into two sections: A. Household-level characteristics, and B. Intra-household characteristics. Under household-level characteristics, the indicators of childhood malnutrition are the place of residence, income, ethnicity, and household infrastructure. In the case of intra-household characteristics, place of birth, gender of the child, mothers' education, and employment are the key indicators.

Results

Childhood nutrition has long been considered an economic issue related to household income. It has also been found to be connected to several social issues. Malnutrition in childhood ultimately results in substantial losses during adolescence and adulthood. From a human development perspective, good health and nutrition are inherently valuable, contributing to a child's physical and cognitive development. Childhood malnutrition increases a child's susceptibility to several different infections and often delays recovery from these infections, thus posing a large burden of disease in developing countries.⁴ When a child is overweight or obese, their cost of medical care increases significantly in the future. A study from Germany shows that for overweight children, their medical costs are €27 higher than a child of normal weight, and for an obese child medical costs are €62 higher.⁵ Tebeje *et al.*,⁶ showed that malnourished, stressed, and obese mothers have a high chance of having obese children. In addition, a mother's intake of energy-driven, zero-nutritious food and less physical activity are the major contributing factors for raising obese children.

Child malnutrition is one of the crucial issues of any developing country. Although, in percentage terms, the share of malnourished children has fallen over the last 30 years around the world, the absolute number of malnourished children continues to show an increasing trend.⁷ The problem of malnutrition

in poor economies can be defined as a 'syndrome of developmental impairment', which considers growth failure, delayed cognitive and behavioural development, and increased morbidity and mortality.⁸

India has a high share of malnourished children coexisting with a large stock of food grain.⁹ This may be due to a lack of capacity to avail or access the food grain, or it may be due to the prevalence of other health problems. The determinants of childhood malnutrition can be divided into three levels of causality: immediate, underlying, and basic. Immediate causes are dietary and health status, which are influenced by food security, the level of health care available to mothers, and environmental health quality. Among the underlying factors, women's education and employment are crucial. Finally, the most important basic factor is per capita national income.⁷ It has also been observed that childhood malnutrition has fallen marginally in India during the 1990s, since the maximum improvement in nutritional status has been observed among the upper socioeconomic groups.¹⁰ Mohseni *et al.*,¹¹ showed that socioeconomic factors such as gender, a father's occupation, and a mother's education level play a significant role in the nutrition level of children in Iran. According to this article, malnutrition has a negative impact on the body due to the imbalance of energy and other nutrients. Many studies focus on economic and social environments and their inequality as the most important reasons for malnutrition.^{12,13} These factors can be grouped into two broad sets: the household level and the intra-household level.

Discussion

Household-level Characteristics

Income and Ethnicity

There is little doubt that household income is a crucial factor in determining both childhood health and nutrition. A study was conducted in the United States to determine the effect of race and ethnicity on nutrition level. In this study, malnutrition was measured in terms of being overweight. It has been observed that children originally from African backgrounds have a higher chance of being overweight than other children. In addition, African girls have a 6%-7% higher chance of being overweight than Mexican-American boys.¹⁴

In less developed and developing countries, it has been observed that wealthier families are more prone to being overweight than poor families because of their tendency to consume less nutritious, but expensive, fast food. On the other hand, in developed countries, migrant people who are relatively poor typically eat traditional, non-nutritious food, while affluent people choose healthy food.¹⁵

A survey of 12 countries proved that an increase in the income of individual households, or of the nation as a whole, reduces malnutrition by the same proportion.¹⁶ Using a four-round panel data set from North-western Tanzania, Alderman *et al.*,¹⁷ estimated the determinants of a child's nutritional status. The results show that better nutrition is associated with a higher income, and that nutritional interventions have a substantial beneficial effect. Policy simulations demonstrate that if one intends to halve malnutrition rates by 2015 (the MDG objective), income growth will have to be complemented by large-scale program interventions.

Studies show that economic and social environments and their inequality are important reasons for malnutrition.^{12,18} Hackett *et al.*,¹⁹ conducted a study to identify determinants of child anthropometrics in a sample of poor Colombian children living in small municipalities. They discussed the influence of household consumption and public infrastructure on childhood malnutrition. Taking into account the endogeneity of household consumption, they used two sets of instruments: household assets and municipality average wage. They found that both are important determinants of a child's nutritional status. The study also found that the coverage of a community's piped water network positively influenced a child's health, provided the parents had some education.

Brekke *et al.*,²⁰ opined that Nordic countries appear to have a steeper income-health gradient than other countries. According to the authors, the correlation between income and health will be weaker with increasing noise regarding other determinants of income. If the Nordic countries succeed in reducing the impacts of other factors influencing income, such as social class, then the correlation between income and health will be stronger.

Based on a 2011 survey in Bangladesh,²¹ a multilevel logistic regression analysis showed that age, a child's sex, a mother's body mass index, a mother's educational status, a father's educational status, place of residence, socioeconomic status, community status, religion, region of residence, and food security are significant factors of childhood malnutrition. Children with poor socioeconomic and community status were at a higher risk of malnutrition, and children from food-insecure families were more likely to be malnourished. Studies show that the malnutrition level is significantly different for various communities and income levels.

Place of Residence

It has been found that children living in urban locations are taller than other children their age.²² There is typically a better provision of healthcare in cities and towns than in the countryside. Bharati *et al.*,²³ found that along with other socio-economic factors, the effect of spatial difference, especially the rural–urban difference, was significant regarding health status. However, when the effects of age and socioeconomic variables were removed, the spatial effect decreased. According to Ghosh,²⁴ because of an urban lifestyle and lack of physical activity, urban children, irrespective of gender, are more obese than their rural counterparts.

Household Infrastructure

Bassolé²⁵ found that in India, access to safe drinking water improves the HAZ—in other words, reduces the stunting of the lowest (10th) income quintile—and that developed health facilities are also improving the health status of the 10th, 25th, and 50th percentiles of income groups at the national level. However, in rural areas, only health facilities have a positive and significant effect on a child's health. Increased latrine coverage is effective for reducing exposure to faecal pathogens and preventing disease, and in the long run, reducing malnutrition. This has been proven through a study in Orissa.²⁶

Intra-Household Characteristics

Birth Order

Nutrients available to children are largely determined by intra-household characteristics or indicators. One such indicator is the birth order of the child. Birth order refers to the sequence of birth. For example, the birth order of the first child in the household

is one. A model was developed by Behrman²⁷ to estimate critical parameters of parental preferences regarding the allocation of nutrients among their children. Latent variable estimation in rural south India indicates that parental preferences have productivity-equity trade-offs, and parents favour older children. When parents cannot afford to purchase sufficient food, they tend to first feed their older children, as they think that those children can start earning wages earlier. This exposes their younger children to greater malnutrition risk. Ranger *et al.*,²² posited that the absence of rival younger siblings also improves nutritional status. Zakaria *et al.*,²⁸ also reported that childhood malnutrition is positively correlated to birth order. This means that children with a higher birth order have a higher chance of being malnourished.

Sex of the Child

Another important intra-household determinant is the sex of the child. Several studies found that mothers prefer to offer better nutrients to sons due to societal preference mapping. A similar result was observed from West Bengal through a study by Sen and Sengupta²⁹ at Santiniketan. The authors examined the nutritional status of children less than 5 years of age in the two villages of Sahajapur and Kuchli. The study showed a remarkably high incidence of undernourishment and deprivation, even of the 'severe' and 'disastrous' types, in girls vis-a-vis boys. Interestingly, the village with the better overall nutritional record had much sharper sex discrimination against girls. The economic benefits of land reform in Kuchli seem to have primarily benefited boys, not girls. The nutritional conditions of girls were broadly similar in the two villages. Overall nutritional status is better for Kuchli than for Sahajapur. This is attributed to the better nutritional condition of the boys, proving a clear sex bias.

In Pakistan, malnutrition is significantly higher among girls than boys, indicating a crucial child-level gender issue. The study illustrating this shows that this gender bias is related to family income and breast-feeding practices.³⁰ However, Bharati *et al.*,²³ examined India's National Family Health Survey-2 data to assess the spatial distribution of nutritional status for children less than three years of age through Z-scores of weight-for-age, HAZ, and WAZ. Regression results show that the gender difference

is not very pronounced, and becomes almost null when the effects of age and socio-demographic variables are removed.

Maternal Characteristics

Parents, particularly mothers, are generally committed to providing every possible advantage of proper health care to their children and to ensuring better health status to fulfil their potential needs.³¹ Moreover, with respect to their child's health, mothers have been generally considered health care workers.³² Thus, there are reasons to expect the individual characteristics of women, particularly their education, employment status, and health care behaviour, have an independent and predominant influence on their child's health.

Maternal education

Many studies have been conducted on the relationship between a mother's education and employment status and her child's nutritional status. The researchers, however, are divided into separate groups regarding the impact of maternal characteristics on childhood malnutrition. Several studies proved that there is a positive linear association between a mother's education level and her child's nutrition level. It is increasingly recognised that a mother's education provides better access to knowledge and awareness, proper feeding practises, and better hygiene.^{33,34} It has been found that children of educated mothers are more nourished than illiterate mothers.³⁵ A study from Indonesia shows that a mother's education is a strong predictor of her child's nutritional improvement over time.³⁶ Sahn and Stifel³⁷ showed that the number of years a mother spent at school creates a positive impact on her daughter's nutrition level instead of her son's nutrition level, and that a father's education favours his son's nutrition level in South Africa. A study on Nigeria posits that policies to reduce child malnutrition should include women's educational programs and public health programmes.³⁸ Lindelow³⁹ found that the utilisation of health services is determined not solely by an individual's own education in Mozambique, but rather by effective education, which includes the educational attainment of other household members. Barrera⁴⁰ proved that maternal education positively affects a child's health, which was measured in this study by HAZ. There is a difference in its impact

across age groups, with pre-school aged children showing the greatest impact. The relationship between maternal education and public health programs suggests that maternal education improves a child's health through the public health system by efficiently utilising the resources of the system. This is how, at a lower cost of information, a satisfactory improvement in the level of childhood nutrition is achieved.

Another study in India showed that a grandmother's education is more important than a mother's education in determining a child's nutrition level.⁴¹ The study points out that a mother's independence at the community level is even more important than her education. A study in Brazil showed that a mother's exposure to media and her general awareness are more important than her education for the nutritional development of her children.³⁴

The World Bank's first community nutrition loan to Indonesia in the 1970s significantly improved the nutritional status of 40 percent of the target children through nutrition education alone, without any other factor. Moestue *et al.*,³³ proved that a mother's education does not necessarily have a linear relationship with child malnourishment. The reason for this might be due to increased employment by educated women, leading to negative consequences for children and a change in breastfeeding practises, which outweigh the potential benefit of a mother's education. Community-level maternal literacy is far more important than individual education levels. Similarly, Glewwe⁴² found that a mother's education has little impact on her child's nutrition level if there is no specific health knowledge. Therefore, it is not the traditional education level, but instead the specific health knowledge the mother has acquired that is more impactful to her child's nutritional status. A father's education, while less significant, also contributes to his child's nutrition levels.

Another study in South Africa⁴³ showed that for a three-year-old child, having a mother undergoing study increased the risk of stunting by 18.21 times and having a working mother increased the risk of being overweight by 17.87 times. A study was conducted in Malawi in 1992 that tried to determine the influence of some socioeconomic factors on a child's nutrition level.⁴⁴ The authors found no

significant relationship between a mother's education and her child's nutrition level.

Maternal Employment Status

The effect of maternal employment on child malnutrition is debateable, as it is not always true that employed mothers have well-nourished children. On the one hand, increased participation in the labour force by women would mean more empowerment for the mothers so that they can make better decisions about their child's feeding and other practises. A mother's employment status, assumed to be synonymous with more empowerment, is hypothesised to improve her child's nourishment status by providing better access to food and medical care. On the other hand, studies have demonstrated other findings that are not always in tune with these expectations. The increased time demands of an occupation may mean mothers have less time to care for their children, which can contribute to their malnourishment.

Rizzo *et al.*,⁴⁵ showed that women from rural Kenya who are forced to shift from adequate employment to under-employment had significantly lighter babies. León and Younger⁴⁶ found that any transfer of payment to the mothers did not result in a significant change in the nutrition level of children in Ecuador. A study from the United States showed that maternal employment makes little difference to children's health.⁴⁷ If there is any positive effect, it is attributed to the availability of additional financial resources and the fact that a working mother may be a more positive role model.

Researchers have concluded that modernisation and urbanisation lead to an expansion in the level of female employment, which improves the health condition of children by sharing the burden of childcare costs. Berman *et al.*,⁴⁸ found that if a mother, particularly from a poor household, becomes employed, this leads to an increase in the level of household income, and hence a positive impact on her child's health. Maternal employment produces extra income in households that can be used to purchase food, clothing, and medical care, all of which provide a positive impact on a child's health.

Huston and Aronson⁴⁹ addressed the question of how maternal employment is related to the amount

of time mothers spend with their infants. They argued that an employed mother spent less time with their infant than an unemployed mother. They also observed that the quality of time spent with children is also different for employed vs. unemployed women. Employed mothers are observed as more focused and pay more attention within their limited time to their children than unemployed mothers. They concluded that the negative effects of maternal employment are nullified by the positive effect of more quality time spent by the employed mothers with their children.

On the other hand, many researchers have argued that maternal employment is associated with an adverse effect on a child's health. They suggest that maternal employment leads to worsening health status for children and increases their mortality rate. Similar to other research cited previously, the authors of these articles found this primarily occurs due to a shortage of time allocated to childcare and breastfeeding.^{50,51,52}

A case study on Dhaka⁵³ showed a strong positive association between the employment of mothers outside home and the risk of severe malnourishment in children. This study also showed that for children less than six years of age, full-time maternal employment significantly reduces the chance of maintaining adequate vitamin A levels.

Mothers' Health Awareness and Childhood Nutrition

Another important variable is the utilisation of maternal health care services by pregnant mothers. A study in Morocco showed that a mother's health knowledge regarding pregnancy is a crucial factor for her child-health-seeking behaviour.⁵⁴

Antenatal care (including tetanus toxoid injections, weight check-ups, and consumption of vitamin A and iron tablets) is theorised to ensure not only safe delivery, but also results in better growth rates among children.⁵⁵ The use of professional antenatal care is postulated to be impactful on a child's health, and its prevalence depends on a mother's educational attainment and exposure to media messages, among other factors. This demonstrates that one explanatory variable (the use of antenatal care) is dependent on another explanatory variable (a mother's education

level). This is called the endogeneity problem. Given such endogeneity, Halim *et al.*,⁵⁶ used the concept of instrumental variables to analyse the problem and found that children are more likely to be healthy when their mothers maintain good health and seek proper antenatal care.

Other Maternal Characteristics

Ordered logistic regression analysis on the data of Botswana performed by Tharakan *et al.*,⁵⁷ showed the importance of some other factors on the level of childhood malnutrition. The authors place them under four broad categories: biological, cultural, economic, and morbidity factors. Some of the relevant data such as age, birth weight, duration of breast-feeding, gender of the family head, education levels of the mother and father, and the presence of a child caretaker have already been discussed. Some additional factors are also mentioned including: the intake level of milk and dairy products, consumption of staple foods, cereals, and beverages, and the incidence of cough and diarrhoea. The influence of these factors should be considered when developing interventional strategies to reduce the level of malnutrition in children.

David *et al.*,⁵⁸ found that maternal stature, the age gap between older and younger siblings, household size, and income levels are the main determinants of anthropometric development in children. They found that within homogeneous communities of Western Honduras, a woman's education is also related to her child's nutritional status. Another study in Nigeria illustrated a policy to reduce child malnutrition from the current significant level by targeting women with educational programs, clean drinking water, and a more healthy environment in rural areas.³⁸

A study in Bangladesh showed that maternal pregnancy intentions are associated with child stunting, wasting, and being underweight.⁵⁹ If this association is proved to be causal, preventing unwanted pregnancies may help to reduce the prevalence of childhood malnutrition in Bangladesh. An interesting study conducted in South India showed that maternal mental depression at the time of pregnancy or a low level of intelligence in mothers are significant factors of malnutrition in children.⁶⁰

Other Factors

Domestic violence has harmful physical and psychological health effects, but there has been little evidence regarding the relationship between domestic violence and malnutrition. To investigate this relationship, Ackerson *et al.*,⁶¹ analysed data from the 1998 to 1999 Indian National Family Health Survey. Physical domestic violence victimisation was self-reported by women in this survey. Aspects of nutritional status analysed in this study were the prevalence of anaemia and being underweight. Anaemia was measured with a blood test for haemoglobin. The classification of being underweight was based on anthropometric measurements and determined by a woman's body mass index. This survey also contained data on the stunting and wasting of children. The results indicate an association of domestic violence in the previous year with anaemia and being underweight in women, and a suggested relationship with a child's nutrition level. Possible mechanisms for this relationship include withholding of food as a form of abuse and stress-mediated influences of domestic violence on nutritional outcomes. These findings indicate that reducing domestic violence is important, not only from a moral and intrinsic perspective, but also because of the instrumental health benefits likely to accrue.

Government Initiatives

As childhood malnutrition is a persistent problem in almost all countries, governments are always working to eliminate it through the implementation of various programs. Reddy *et al.*,⁶² showed that Ethiopia is a low-income country that has been struggling with childhood malnutrition for a long time. The country has set a target to eliminate malnutrition by 2030. They have implemented policies including the National Nutrition Strategy 2005-06, and the National Nutrition Policy 2008 with this target in mind, but there is still a long way to go to achieve this objective. Semba⁶³ stated that the United Nation's Programmes are concentrated on protein malnutrition. However, the problem of micronutrient deficiency, which is currently more acute, is not addressed by these measures. Through a systematic literature review, Goudet *et al.*,⁶⁴ showed that the effect of micronutrient supplements on malnourished

children does not show a strong positive impact in low and middle-income countries. The African Union has established the New Partnership for Africa's Development (NEPAD), whose objectives include reducing hunger as well as improving nutritional development.⁶⁵

Bain *et al.*,⁶⁶ stated that increasing the growth of genetically developed and modified food and improving sociocultural conditions are solutions for food insecurity, which is considered to be one of the significant contributors to childhood malnutrition. A study in Bangladesh by Khan and Raja⁶⁷ showed that improvement in WASH (water, sanitation, and hygiene) can protect children from malnutrition. The government is also trying to improve this infrastructure there. In Indonesia, the government implemented many developmental programs to eliminate malnutrition. Some impactful examples of these programs include health insurance, community capacity development, and micro credit provision. India is also trying hard to eliminate childhood malnutrition. Some important programs they have implemented are: the Integrated Child Development Scheme (ICDS), a nutrition program for children under the age of five, as well as pregnant and lactating mothers, and the wheat based Supplementary Nutrition Program through the Public Distribution System.⁶⁸

Conclusion

There are many factors responsible for childhood malnutrition, and there is a lot of literature available on this topic. This paper discusses some of them. Economic conditions, the social culture of the household, its consumption patterns, and its relationship with the outside world are all important for improvement in a child's nutrition level. Sanitation and common hygiene are also important factors. Some country-based studies have shown that urban children have a higher probability of being well-nourished than their rural counterparts. An analysis

showed that parents who are engaging their older child for earning purposes tend to be more concerned about the older child. Subsequently, younger children have a higher chance of being malnourished. Several studies have shown that there is a strong gender bias against a girl child regarding nutrition distribution in a household. There is controversy concerning the relationship between a mother's employment and her child's nutrition level in several studies. Some studies claim that the employment of mothers is beneficial as it provides a feeling of empowerment, while others say employment is detrimental as it results in a less time for the mothers to take care of their children. Increasing a mother's health awareness and education have a positive impact on her child's nutrition. There are also many additional factors that can influence a child's nutrition level. In short, socio-economic determinants such as income, ethnicity, geographical location, and intra-household parental and child level factors play a crucial role in the nutritional status of children. Various governments throughout the world are working hard to overcome this problem by implementing a variety of programs. Some of them are targeted projects, while others are more universal in scope. However, recent trends in childhood malnutrition indicate that there is a long way to go to eradicate this problem.

Acknowledgements

The author acknowledges various online open access journals and search engines to get the help to find out the relevant articles to prepare this review paper. Several published studies also help a lot to complete the paper.

Funding

The author receives no financial support for the research, authorship and publication of this article.

Conflict of Interest

The authors do not have any conflict of interest.

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