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Economic Factors Associated with Child Malnutrition: A Review of Empirical Literature from 2005 to 2020

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ABSTRACT: Malnutrition is a crucial barrier in the goal of achieving economic development due to a lack of effective labor supply through an unhealthier nation. Children are the most adverse group in the malnutrition circle and combatting child malnutrition is an essential requirement to achieve a healthier nation for any country for its economic development through efficient labor supply. Identifying the economic factors of child malnutrition is an important initial step in this process. A plenty of researches have been conducted in the world to identify economic factors affecting child malnutrition but the studies on reviewing those past researches are limited. The objective of this study is to accomplish a review of past empirical literature on economic factors and child malnutrition based on the historical approach. A sample of 40 research papers published from 2005 to 2020 in different kinds of journals was selected for getting reviewed using judgment sampling. Analyzing the data was achieved through the use of descriptive statistics and content analysis. The results found that 68% of journal research articles in the sample have discussed economic factors. Family income, wealth index, and employability were the leading economic factors as found by the literature. The results may be a guide for those who are interesting in the issue and may inform the health sector and other authorities where effective future intervention should be improved to overcome the incidence of child malnutrition.

KEYWORDS: *Economic factors, Empirical literature, Income, Malnutrition, Research article*

I. INTRODUCTION

Adequate nutrition is essential for achieving a healthy life and well-functioning of the human body and leads to the upward socio-economic development of any country. Malnutrition creates many health and socio-economics complications being a major public health problem in the developmental concern and childhood malnutrition has remained a big challenge in developing countries. Malnutrition is defined as the deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients [1]. Childhood malnutrition has remained a major public health challenge in developing countries [2]. Globally, 144.0 million of children under 5 are suffering from stunting, 47.0 million and 14.3 million of children under 5 are affected by wasting and severe wasting respectively while 38.3 million are overweight [1]. Child undernutrition has caused more than 3 million preventable child deaths annually [3]. Combatting child malnutrition which leads to continuing the malnutrition cycle is a very important and essential requirement to achieve a healthier nation for any country for its economic development through efficient labor supply.

Generally, it believes that lack of money, poverty, and inequality are the major phenomena linked with child malnutrition. Many researchers have investigated different types of factors affecting malnutrition among children, and numerous research papers have been published in the past on this issue by many countries in the world. (eg: [4], [5], [6]). Strong evidence of the importance of this current issue has been provided by this large volume of publications. As an area of investigation, this has achieved enormous recognition among researchers.

However, the studies on reviewing those past researches are rare to find and it is a main problem of studying economic factors that affect for child malnutrition to those who are interesting in the field. The objective of this study is to accomplish a review of empirical literature on economic factors that affecting malnutrition among children by analyzing past empirical literature from 2005 to 2020. A review of literature of what has been accomplished in the past on economic factors of child malnutrition may direct those who are interesting in the area and it may inform to the health sector and improve the effectiveness of future interventions in this area.

II. METHODOLOGY

This study was carried out with the historical approach of reviewing past empirical literature on the economic factors associated with child malnutrition. A research paper is the unit of analysis in this study and a sample of 40 research papers published from 2005 to 2020 was selected for getting reviewed. One of the non-probability sampling methods called judgment sampling procedure was employed in selecting research articles for the sample due to the unavailability of the sampling frame and inaccessibility for the entire population. The electronic search was directed to search for studies used in this review by searching internet resources. The selected articles have been published in different kinds of journals. Many countries have been investigated by researchers. Case studies research articles were not considered in this study.

Microsoft Excel spreadsheet software program was employed for data entering and data processing. By investigating the research papers, key points were summarized in the excel sheet. The rows were arranged for research articles while the columns were arranged for their important points. This summary includes name of author, year of publication, name of the journal, country investigated, sample size, data types, analytical approach, unit of analysis, measurement of malnutrition and economic factors used as independent variables such as Income, Employability, Wealth Index, Financial Resources, Total Expenditure, Poverty, Child Activity, Housing Condition and Economic Decision. Data analysis was achieved using descriptive statistics and content analysis.

III. RESULT AND DISCUSSION

There have been numerous studies published on economic factors associated with child malnutrition and reviewing them convinces the researchers to identify what has accomplished in the past and what has been remained to investigate further. The results of this study of reviewing literature are systematized under three main heading as key characteristics of the sample, dependent variable, and independent variables.

3.1 Key Characteristics of the Reviewed Research Articles

Key characteristics of the selected articles are year of publication, type of journal, country investigated, size of the sample, data collection method, unit of analysis, analytical approach, and statistical tests.

3.1.1 Year of Publication

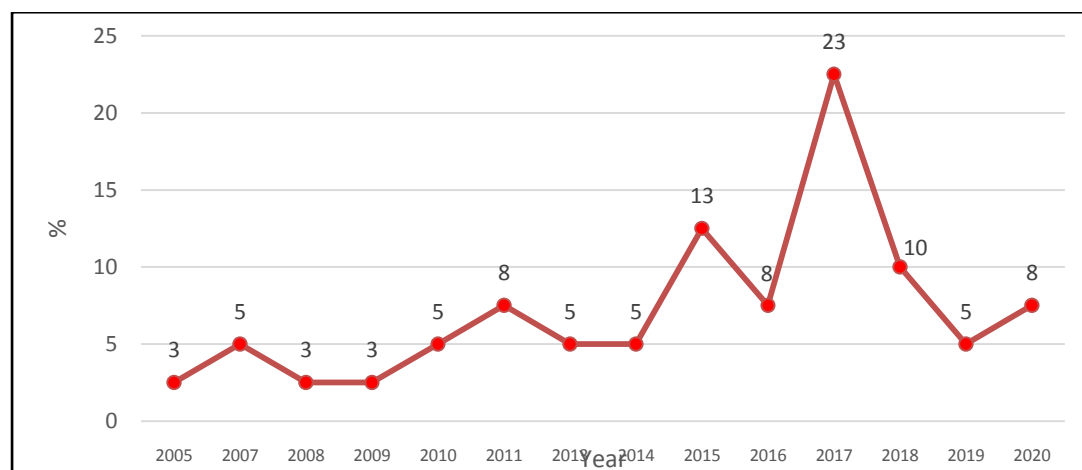


Figure 1: Reviewed research article by year of publication

Source: Literature survey, 2020

Research articles published from 2005 to 2020 were selected for the reviewing process in this study. Fig. 1 shows that the highest percentage of research articles (23%) in the sample have been published in 2017. More than 75% of reviewed articles belonged to the immediate last ten years, from 2011 to 2020. Renewed findings at the current on the issue could be investigated in this study due to these recent publications.

3.1.2 Types of Journal

The majority of selected articles have come from some of the most popular medical journals including, American Journal of Public Health Research, BioMed Research International, Global Health, Science Journal of Public Health, BMC Nutrition, Annual Nutrition Metab, Rural and Remote Health, Maternal and child nutrition, Journal of Tropical Pediatrics among others such as Tropical Agricultural Research and International Journal of Social Economics.

3.1.3 Country of Investigation

Studies on economic and other factors for malnutrition have been conducted in many countries in the world. A majority, 60% out of 40 studies reviewed here, has been conducted in Asian countries. Therefore, the factors investigated are more applicable to work out in Asian countries. The second place has been obtained by African countries recording 35%. Besides, an important contribution has been made by studying European countries and American countries too. This is a clear indication that research on economic factors for malnutrition has recognition around the world. It can be expected that this trend will support to improve the knowledge of the economic factors associated with child malnutrition

3.1.4 Type of data and size of the sample

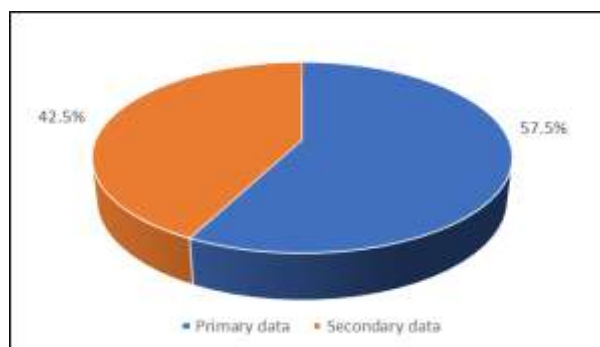


Figure 2: Distribution of the sample by type data source

Source: Literature survey, 2020

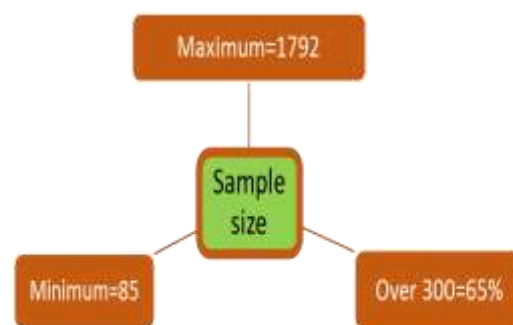


Figure 3: Range of the sample size

Source: Literature survey, 2020

Studies reviewed here have employed both primary and secondary data sources. According to fig.2, the majority of researchers, 57.5% have conducted their research based on primary data while 42.5% have conducted using secondary data. This concludes that the source of primary data is most suitable in research related to the factors of child malnutrition. To a great extent, the ability to gather only precise and relevant data by themselves mainly targeting own research and to overcome the difficulties in handling too much unnecessary data in secondary sources may direct to engagement with primary sources.

As given in fig.3, considering primary data-based studies, the size of the sample ranged from 85 to 1792. The majority, 65% of these studies reported sample sizes of over 300. An adequate and justifiable sample size is essential for any study depending on the analytical method and number of independent variables utilized. The reliability of interpretation may not be satisfied with small sample sizes to a great extent. Results of a few studies appeared to be suspected due to their small sample sizes with analytical techniques involving more variables.

3.1.5 Unit of Analysis

All reviewed article here has used the child as the unit of analysis. However, 80%, the majority of studies has paid their attention to the group of children under five years while only 20% was about school age children. Considering the Sri Lankan context, only 12.5% of studies have investigated Sri Lanka. Besides, only one study has paid attention to school children in the plantation community in Sri Lanka. It is obvious that less attention has been made to school-age children. School children who are at the door of the adolescent group will play a vital role in the immediate future labor force that contributes to country development. Therefore, motivating the researchers to study the determinants of malnutrition focusing the school children is timely important.

3.1.6 Method of Analysis

Considering the analytical approach, 58% of the research studies have employed binary or multivariate logistic regression techniques. It is obvious that logistic regression analysis was the most popular analytical approach adopted by researchers. The nominal scale of the categorical dependent variable, suffering or not suffering from malnutrition may be the main reason behind this. Besides, various types of approaches such as the t-test, chi-square test, ANOVA, discriminant analysis, log linear model, and structural equation were also used.

3.2. Dependent Variable- Malnutrition

The variable, incidence of child malnutrition has played the key role in the discussion made through these reviewed articles as the dependent variable. Different types of measurements for indicating child malnutrition were applied as the dependent variable.

Usually, there have been three methods to assess health or nutritional status representing anthropometric indicators, biochemical indicators, and clinical indicators. Among them, anthropometric measurement is the most popular, common, and easy assessment of the health and nutritional status of children. With international consistency, anthropometric indicators advocated to measure malnutrition are Birth Weight: malnutrition at birth, Weight For Age (WFA): underweight, Height For Age (HFA): stunting, Weight For Height (WFH): wasting, and body mass index. Studies in this review have utilized one or more of these indicators for the assessment of child malnutrition as given in the table 1.

Table 1: Indices Applied by the Reviewed Studies to Measure Malnutrition

Index	Reference
BMI	Galgamuwa, Iddawela and et al. (2017) [7]; Getaneh, Melku and et al. (2019) [8]; Igbokwe, Adimorah and et al. (2017) [4]; Kulaga, Litwin and et al. (2010) [9]; Tette, Sifah and et al. (2016) [10]; Zhang, Bécares and Chandola (2016) [11]
WFH	Ahsan, Mansoor and et al. (2017) [12]; Fagbamigbe, Kandala& Uthman (2020) [2]; Habyarimana, Zewotir and Ramroop (2016) [13]; Jayawardena (2015) [14]; Keerthiwansa, Gajealan, Sivaraja and Subashiniv (2014) [15]; Pravana, Piryani and et al. (2017) [16]; Rahman, Chowdhury and Hossain (2009) [17]
WFA	Cheah, Abdul Manan and Zabidi-Hussin (2010) [18]; Chowdhury, Chakrabarty and et al. (2018) [19]; Das and Gulshan (2017) [20]; Demissie, and Worku (2013) [21]; Hannah, Sekarwana and Effendi (2017) [22]; Justice Moses K. Aheto, Thomas J. Keegan and et al. (2015) [23]; Kabir, Rahman and et al. (2018) [24]; Sargana, and Mohyuddin (2013) [25]; Yadav and Dixit (2017) [26]
HFA	Duru, Oluoha and et al. (2015) [27]; Gebre, Reddy and et al. (2019) [28]; Kandala, Madungu, Emina, and et al. (2011) [29]; Khan and Mohanty (2018) [5]; Linnemayr, Alderman and et al. (2008) [30]; Mustari, Hossain, Khatun, Ali, Rahman, Mondal, Iqbal, Neshad and Islam (2017) [31]; Oliveira Assis, Lima Barreto and et al. (2007) [32]; Rahman and Chowdhury (2007) [33]; Rathnayake, and Weerahewa (2005) [34]; Soares Magalhães and Clements (2011) [35]; Ubeysekara, Jayathissa and Wijesinghe (2015) [36]
MUAC	Ayana, Hailemariam and Melke (2015) [37]; Dodos, Altare, Bechir and et al. (2018) [38]; Ghimire, Aryal and et al. (2020) [6]; Hossain, Niroula and et al. (2020) [39]
CIAF	Ali Khan and Azid (2011) [40]; Endris, Asefa and Dube (2017) [41]
New Index	Debnath and Bhattacharjee (2014) [42]

Source: Literature survey, 2020

Table 2: Percentage of Indices Applied by Reviewed Articles

Index	BMI	WFH	WFA	HFA	MUAC	Others
Count	6	7	9	11	4	3
Percentage	15	17.5	22.5	27.5	10	7.5

Source: Literature survey, 2020

According to the table 2, the highest percentage of researches have measured malnutrition in terms of HFA. It is noticeable that three indices, HFA, WFA and WFH are dominating in the context.

3.3 Independent Variables- Economic Factors for Malnutrition

Economic factors associated with child malnutrition are the independent variables discussed in reviewed studies. Key attention of malnutrition studies is diverse factors or determinants or variables investigated by researchers to influence child malnutrition. According to the empirical literature, child malnutrition has long been investigated as an economic issue associated with household income and many other economic factors. Furthermore, it was found several other issues too that were linked with child malnutrition related to the non-economic category.

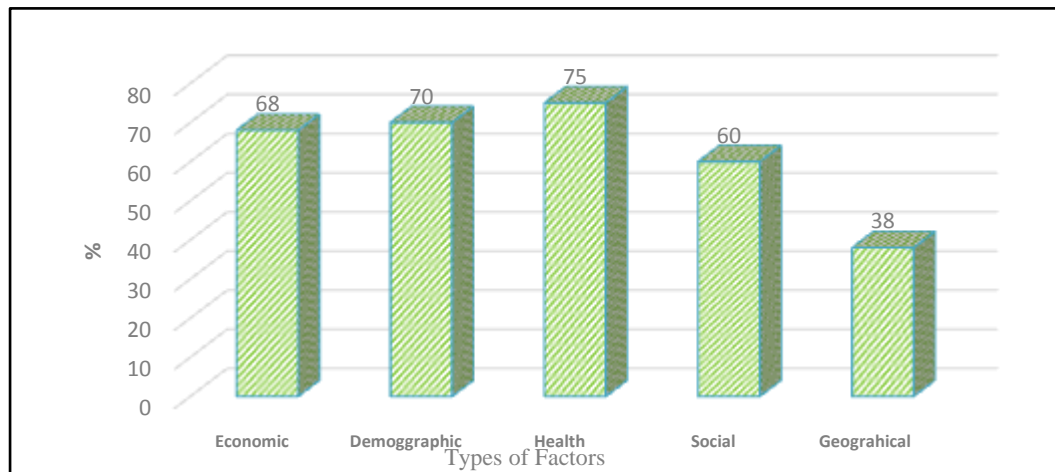


Figure 4: Percentage of economic and other factors

Source: Literature survey data, 2020

Fig. 4 shows the distribution of reviewed articles according to the different types of factors. Economic factors have been studied by 68% of the reviewed research articles. Socio-economic status of parents is significantly associated with the nutritional status of children [26]. Low socioeconomic status has made a significant contribution in deciding the incidence of malnutrition among children [39], [8], [16].

Table 3: Economic Factors Investigated by Reviewed Research Articles

Economic Factors	Reference
Income	Ayana, Hailemariam and Melke (2015) [37]; Cheah, Abdul Manan and Zabidi-Hussin (2010) [18]; Fagbamigbe, Kandala & Uthman (2020) [2]; Galgamuwa, Iddawela, Dharmaratne and et al. (2017) [7]; Kabir, Rahman and et al. (2018) [24]; Keerthiwansa, Gajealan, Sivaraja and Subashiniv (2014) [15]; Oliveira Assis, Lima Barreto and et al. (2008) [32]; Rathnayake and Weerahewa (2005) [34]; Sargana, and Mohyuddin (2013) [25]; Tette, Sifah, Nartey and et al. (2016) [10]; Ubeysekara, Jayathissa and Wijesinghe (2015) [36]; Zhang, Bécares and Chandola (2016) [11]
Wealth index	Chowdhury, Chakrabarty and Rakib (2018) [19]; Das, and Gulshan (2017) [20]; Endris, Asefa and Dube (2017) [41]; Getaneh, Melku, Geta and et al. (2019) [8]; Habyarimana, Zewotir, and Ramroop (2016) [13]
Employability	Ayana, Hailemariam and Melke (2015) [37]; Das and Gulshan (2017) [20]; Duru, Oluoha, Uwakwe and et al. (2015) [27]; Galgamuwa, Iddawela, Dharmaratne and et al. (2017) [7]; Keerthiwansa, Gajealan, Sivaraja and Subashiniv (2014) [15]; Ubeysekara, Jayathissa and Wijesinghe (2015) [36]
Financial Resources	Dodos, Altare, Bechir and et al (2018) [38]
Total Expenditure	Cheah, Abdul Manan, Zabidi-Hussin (2010) [18]
Poverty	Khan and Mohanty (2018) [5]
Child Activity	Ali Khan and Azid (2011) [40]
Housing Condition	Cheah, Abdul Manan and Zabidi-Hussin (2010) [18]
Economic Decision	Kandala, Madungu, Emina, and et al. (2011) [29]

Source: Literature survey data, 2020

Table 3 shows the different economic factors investigated in the reviewed research articles and they are treated as independent variables. The key attention of this study has been paid for reviewing those economic factors influencing child malnutrition and they were filtered and reviewed from the research articles on various demographic, socioeconomic, health and geographical factors on child malnutrition. According to the empirical literature, investigated economic factors are family Income, Wealth index, Employability, Financial Resources, Total Expenditure, Poverty, Child Activity, Housing Condition and Economic Decision.

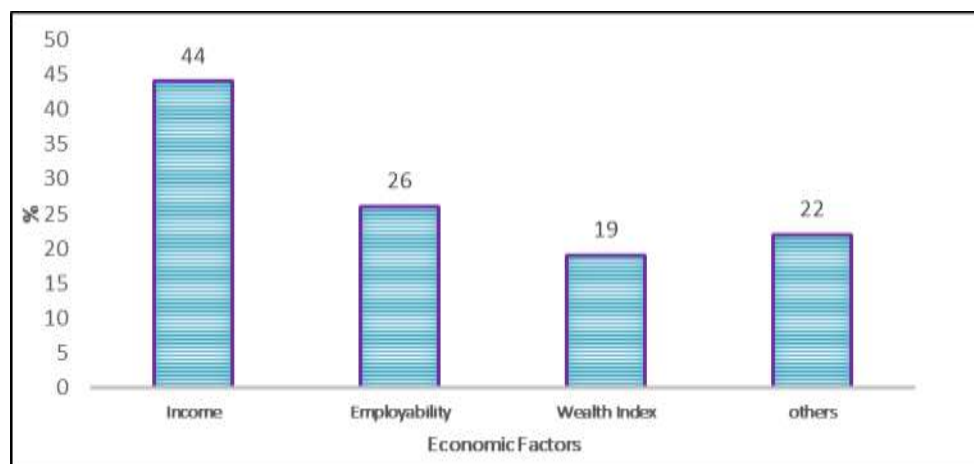


Figure 5: Percentages of various economic factors

Source: Literature survey data, 2020

Fig.5 shows the percentages of research articles of each economic factor from the total research articles that investigated economic factors. Income (44%) was the key economic factor investigated by the majority of the research articles. Employability (26%) has received the second place while third importance has gone to the wealth index (19%). Other group (22%) includes Financial Resources, Total Expenditure, Poverty, Child Activity, Housing Condition and Economic Decision.

Income: Income is the key factor attached to the group of economic factors. Income or paternal income was investigated by 44.4% of journal articles which considered economic factors and for 92% of them, the income was found to be significant. Malnutrition was significantly associated with household income [37] [18] [32]. Having lower family incomes increases the risk of having malnutrition in their children [24], [10], [11]. Nutritional outcomes of children in rural areas are influenced by the parental income [13]. A significance relationship was found between family income and the eating habits of children [25]. In Sri Lanka context, Low income appeared to be an important factor associated with child malnutrition in Sri Lanka [7], [15], [34]. In contrast, income has established an insignificant relationship with nutritional status [36].

Employability: Employability is another economic factor responsible for child malnutrition. Mother's occupation is a significant factor in the nutritional status of children [20], [27]. The paternal occupation was found to be significant in two studies [37], [27]. Maternal employment appeared to be an important factor associated with undernutrition among both preschool and school children in plantation community in Sri Lanka [7]. In contrast, Malnutrition in all terms of wasting, underweight and stunting was higher among children whose mothers are unemployed than the employed mothers [36]. Mother being a housewife cause to increase incidence of child malnutrition in the study of malnutrition and anemia among hospitalized children in Vavuniya [15].

Wealth index: The wealth index has been identified as another important factor among economic determinants. Children in lower wealth index were more likely to be malnourished than those who were in upper socioeconomic class [8], [19], [20], [41]. Wealth index of the household was identified as the main determinant of malnutrition in the study of children under age five in Rwanda [13]. There was a relationship between monthly financial resources < 35,000 FCFA and severe acute malnutrition among children [38].

Other economic related factors: A few studies have talked about financial resources, Total expenditure, Poverty, Child labor or home-care activity, Housing condition including the number of rooms in the house, type of roof, wall, the floor of the house was made from, some Economic decisions and policies. Total expenditure had a significant impact on malnutrition among children [18]. Poverty of households was a strong and significant predictor of the incidence of malnutrition [5]. The probability for anthropometric failure increases by the activity of the child (child labor or home-care activity) [40].

Considering the housing condition, an important investigation has not been made by reviewed studies. For the studies that examined housing condition too, the relationship was not significant (type of roof, type of wall). However, Number of rooms in the house had a significant effect on malnutrition [18]. Economic decision to sell more than the population consumes may cause to increase in childhood malnutrition [29].

IV. CONCLUSIONS

Many researches articles have investigated economic and many other factors affected for child malnutrition and a large volume of publications are available on this. Economic factors have been studied by 68% of the reviewed research papers. More than 75% of reviewed research papers belonged to the immediate last ten years, from 2011 to 2020. Bivariate or multivariate logistic regression technique has been adopted by most of the studies as a popular approach to fit a model on malnutrition determinants where the dependent variable is with categorical nominal scale, like suffering or not suffering from malnutrition. The sample size was over 300 for 65% of reviewed studies suggesting a justifiable sample size for reliable interpretation. Less attention has been paid to school children and motivating the researchers is suggested to study the factors for child malnutrition focusing school children since they are the immediate group critical for the future labor force that contributes to country development.

Economic factors investigated by the reviewed research articles include Income, Employability, Wealth Index, Financial Resources, Total Expenditure, Poverty, Child Activity, Housing Condition and Economic Decision. Income is the leading factor associated with child malnutrition. From the reviewed research articles that investigated Economic factors, Income has been studied by 44% and for 92% of them the relationship was found to be significant. Having lower family incomes increases the risk of having malnutrition in their children. Employability and Wealth index have too received a considerable significance as economic factors associated with child malnutrition. Malnutrition in all terms of wasting, underweight and stunting was higher among children whose mothers are unemployed than the employed mothers. Children in lower wealth index were more likely to be malnourished than those who were in upper socioeconomic class. Total expenditure, Poverty, Child labor or home-care activity, Housing condition including the number of rooms in the house, type of roof, wall, the floor of the house was made from, some Economic decisions and policies are the other economic factors investigated by some of the reviewed research articles.

These findings identified that the less attention has been paid by the reviewed studies to the economic factors related to the school children. Motivating the future researchers is suggested to study the economic factors and malnutrition focusing school children since they are the immediate group critical for the future labor force that contributes to country development. And also, these finding may direct future researchers and scholars who are interesting in the area and may inform the health sector and other authorities where the effective future intervention should be improved to overcome the incidence of child malnutrition.

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