**ABSTRACT**

Double burden of nutrition is a nutritional problem where undernutrition and overnutrition occur together. It might happen at the level of the individual, the household, and the population. This article’s goal is to ascertain how double burden of nutrition affects health, economy, and productivity. The literature review approach was used to construct this paper. Results were sourced from the Google Scholar database and then selected and examined more deeply the findings. The findings of this literature review highlight the effects of the health aspect which include the emergence of infectious, chronic diseases, and cognitive impairment; the economic aspect which leads in poverty and difficulty in finding employment opportunities; and the aspect of the country's productivity will decrease.

**Keywords:**

- Double Burden of Malnutrition
- Impact on Health
- Overnutrition
- Undernutrition

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**INTRODUCTION**

One of the main issues with nutrition is namely double burden of malnutrition, which arises from two nutrition problems coexisting, undernutrition and overnutrition. The double burden of malnutrition or abbreviated as DBM might be happen at the levels of individual, household and community. At the individual levels, double burden of malnutrition occurs in undernourished children who grow up to be overnourished or obese as adults. At the household levels, double burden of malnutrition occurs where undernourished children live with overweight or obese mothers. At the community levels, double burden of malnutrition happens when undernutrition and overnutrition occur simultaneously in the same community [18].

In Indonesia, the prevalence of stunting, wasting, underweight, and overweight has decreased, according to the findings of Riset Kesehatan Dasar (Riskesdas) in 2018 and Survey Status Gizi Indonesia in 2019. However, the indicators have not reached the target so that nutrition problems in Indonesia are quite high [8]. According to the 2018 Riskesdas report, the prevalence of overweight reached 31%, while the prevalence of stunting in toddlers reached 11.5% [8]. In certain parts of Indonesia, such as Surakarta, the incidence of double burden of malnutrition was recorded at 13.4%, while in Surabaya, it was recorded at 24.7% [10,14]. The problem is known as a double burden of malnutrition when the BMI as well as TB/U indices show that the prevalence of stunting is more than 5% and obesity is more than 15% [14].

The double burden of malnutrition contributes to increased mortality and morbidity rates. A single nutritional issue can affect multiple sectors and the negative impact are amplified when nutrition is considered as a double burden. People who suffer from malnutrition have an impact on health and productivity, such as the emergence of non-communicable diseases and decreased productivity of the country [12]. Meanwhile, the impact of overnutrition or obesity can lead to type 2 diabetes mellitus, cardiovascular disease, and hypertension.
[10]. However, the double burden of malnutrition still exists today. Undernutrition as well as overnutrition interventions have not optimally resolved this problem. Thus, the purpose of this article is to ascertain the impacts of double burden malnutrition from various perspectives, specifically the impacts on productivity, economy, and health.

**METHOD**

This research employs a review methodology based on the results of multiple studies. The process of gathering data involved looking through and choosing articles from the database. Using the keywords double burden of malnutrition (for international journals) and dampak beban gizi ganda (for national journals) to find articles published between 2019-2024 in the Google Scholar database. Seven papers were produced as material for the literature review after selected through titles and abstracts which will be throughly examined and reviewed.

**RESULTS AND DISCUSSION**

The following table displays the findings from the data article analysis concerning the effects of the double burden of malnutrition:

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<thead>
<tr>
<th>No.</th>
<th>Title</th>
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<th>Methods</th>
<th>Results</th>
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<tr>
<td>1</td>
<td>Double Burden of Malnutrition as A Risk Factor For Overweight and Obesity</td>
<td>Bernabé-Ortiz et al. / 2022</td>
<td>This study is a prospective cohort study consisting of 4 groups: stunted children and non overweight mothers, stunted children and overweight mothers (DBM), non-stunted children and non-overweight mothers, non-stunted children and overweight mothers. Sampling technique with cluster stratified random sampling.</td>
<td>Stunted children and overweight mothers had a higher chance of being overweight (RR = 1.64; 95% CI: 1.35-1.99) compared to stunted children and non-overweight mothers (RR = 1.35; 95% CI: 1.10-1.72), had a higher risk of obesity in non-stunted children &amp; overweight mothers (RR = 2.33; 95% CI: 1.68-3.22), had a higher risk in stunted children &amp; non-overweight mothers (RR = 2.59; 95% CI: 1.75-3.84), and also had a higher chance in stunted children &amp; overweight mothers (RR = 2.14; 95% CI: 1.39-3.28).</td>
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<td>2</td>
<td>Hubungan Tingkat Ketahanan Pangan Dengan Kejadian Beban Gizi Ganda Di Rumah Tangga Di Kota Surakarta</td>
<td>Setyaningsih et al. / 2022</td>
<td>This article is a quantitative study and uses a cross sectional research design. Data were collected through anthropometric measurements and the HFIAS food security questionnaire for mothers and children under the age of 12 years. The sampling method used was snowball sampling.</td>
<td>Families experiencing food insecurity of 13.4% to 21.7% also had a 4.189 times higher risk of DBM than families with food security (95% CI = 2.085-8.416). This study also shows that the level of food security in households is correlated with DBM cases so efforts are needed to improve food security in households.</td>
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<td>3</td>
<td>Malnutrition In Early Life And Its Neurodevelopmental And Cognitive Consequence: A Scoping Review</td>
<td>Suryawan et al. / 2022</td>
<td>The scoping review study was retrieved from PubMed and Cochrane and found 26 articles. Articles were selected based on titles and abstracts that had been filtered based on inclusion criteria.</td>
<td>Stunted children with cognitive and neurodevelopmental deficits have the potential to recover before the age of 8, particularly in individuals whose nutritional status is better. Overweight only effects concentration, gross motor abilities, and executive function in terms of cognitive neurodevelopment. While circumstances characterized by underweight, stunting, and</td>
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<td>4</td>
<td>Prevalence And Socio-Economic Impacts Of Malnutrition Among Children In Uganda</td>
<td>Adebisi, et al. / 2019</td>
<td>This article is a literature review with databases PubMed, Google Scholar, and Ovid pertaining to the issue of childhood malnutrition in Uganda. The articles were screened by title and abstract.</td>
<td>The problem of malnutrition in Uganda is not quite ended and its effects on society can not be ignored. The causes differ from region to region, but are largely attributed to insufficient access to food, lack of variety in diet, cultural traditions, and excessive levels of a low-income. This article examines the affects of double burden of malnutrition on productivity, education, health and well-being. Children who are undernourished find it difficult to focus and pay attention. This has an impact on the child's capacity for learning and academic success, making it difficult for children with low education to find employment opportunities. It also has an impact on health conditions that put them at risk of infections, such as respiratory tract infections and diarrhea.</td>
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<td>5</td>
<td>Relationship Between The Double Burden Of Malnutrition And Mental Health In Overweight And Obese Adult Women</td>
<td>Gholizadeh et al. / 2022</td>
<td>This research involved the random selection of women between the ages 18 to 59 years. The sampling method with multistage cluster randomization.</td>
<td>There was an association between mental health and the incidence of double burden of malnutrition. In addition, after adjusting for their age, energy, and marriage status, a significant association was found between stress and DBM (p&lt;0.04).</td>
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<td>6</td>
<td>The Double Burden Of Malnutrition And Dietary Patterns In Rural Central Java, Indonesia</td>
<td>Lowe et al. / 2021</td>
<td>This article uses a cross sectional study. Evidence were gathered using 24-hour dietary recall, survey about food frequency, and anthropometric measurements.</td>
<td>DBM with 32.3% of stunted children, 68.8% of women aged 35-49 years were overweight, 39% of homes had a double burden of 69% overweight and short individuals, 18% were overweight and underweight, and 13% were overweight, thin, and short. This study found that dietary patterns were associated with soft drinks, snacks, and animal products. Furthermore, this research discovered a slightly significant association between children's nutritional status and underweight (r= -0.139, p&lt;0.01).</td>
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<td>7</td>
<td>The Double Burden Of Malnutrition In India: Trends And Inequalities (2006-2016)</td>
<td>Nguyen et al. / 2021</td>
<td>The research design was a multiple stage stratified sampling design. Data from the National Family Health Surveys in 2006 and 2016 were utilized. From these data, a random selection of 22 households was taken.</td>
<td>Between 2006 and 2016, child and adult undernutrition rates in India declined rapidly, falling from 48% to 38% by gender and region of residence. The article points to a doubling in the number of overweight or obese adults from 10% to 21%, as well as an increase in wealth.</td>
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Double burden of malnutrition is undernutrition and overnutrition occurring simultaneously in a population throughout their life cycle [18]. The lengthening of the interval preceding urbanization is one of the factors contributing to the double burden of malnutrition. Changes in lifestyle patterns with low consumption levels, a diet with fast food, and lack of physical activity using more technology. Furthermore, lacking of knowledge and attitudes of nutrition, low income, unemployment, food insecurity, and low food management [4].

Based on the article review's summary, it is well organized that the impact of the double burden of malnutrition occurs in the aspects of health, economy, and productivity.

1. Health
The review's findings indicate that multiple nutritional problems can lead to other health problems, including double burden of malnutrition at the individual, household, and community levels. Undernutrition and overnutrition can lead to obesity at the individual level. This results from dietary disruptions in organ function and affects individual growth and appetite as well as influencing the risk and metabolic consequences of subsequently becoming overweight or obesity [3]. According to some research, it is said that households experiencing double burden of nutrition conditions are influenced by food insecurity due to the unavailability of access to meet adequate food needs [10,13]. Due to limited access, households consume energy-dense food and lack of food variety. Thus, in cases of DBM at the household level, stunted children have the potential to become obese as adults. This is also the case in Western and Southern Uganda where stunted children are at risk of obesity as adults [16].

A person's immune system is weakened by undernutrition (underweight, stunting, and wasting) and overnutrition (overweight and obesity), leaving them vulnerable to infections, such as acute respiratory infection and diarrhea [1]. In addition to infectious diseases, it also causes other chronic non-communicable diseases, such as atherosclerosis, type 2 diabetes mellitus, cardiovascular disease, and gestational diabetes in pregnant women [2,17]. In pregnant women, the incidence of double burden of nutrition affects labor complications and the occurrence of obstructed labor [17]. In the same study, it was confirmed that undernutrition and overnutrition are risk factors in the occurrence of non-communicable diseases in adults. The impact of the double burden of malnutrition is stress. Research by Gholizadeh examined the relationship between the double burden of malnutrition and the incidence of stress which resulted in a significant relationship (p < 0.04) [5]. This is due to the fact that obesity is linked to psychopathology and brain illnesses, such as eating and mood disorders that have an effect on mental health.

2. Economy
The health effects of multiple nutrition also affect the economy. The disruption of cognitive growth will have an impact on how individuals obtain employment opportunities because it also affects education. Individuals with malnutrition find it difficult to concentrate, which makes it harder for them to learn in class. This makes malnourished children take longer to complete school because their cognitive capacities are compromised [15]. As a result of their inadequate education levels, they will struggle to find work. Thus, it affects the economy of individuals and households and can lead to poverty [1].

3. Productivity
The burden of double nutrition also has an impact on the country's productivity. The state is burdened by its citizens who cannot be productive and even cause poverty. As happened in Uganda, when the shortage of labor and loss of productivity resulted in the Ugandan government suffering a huge loss of around 1.2 shillings or equal to 3.91% of Uganda's GDP [1]. This is due to individuals have a low level of education, which makes it challenging for them to find employment opportunities and contribute to the weak economy of the nation.

CONCLUSION
Double burden of malnutrition has extremely negative effects on health, economy, and productivity. In terms of health, the double burden of malnutrition will lead to other health problems such as obesity, degenerative diseases, infectious diseases, and impaired cognitives growth. In economy aspects will make it difficult to find employment opportunities and it can lead to poverty. This condition also contributes to the low productivity of the nation, which might put a lot of strain on it. In order to lessen the double burden of
malnutrition and ensure that undernutrition and overnutrition coexist and require coordinated interventions, cooperation, and collaboration from all sectors can provide the solution.

REFERENCES


