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Implications of Nutrition on the Academic Prowess of Children: A Review of India and Nigeria

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Abstract

Nutrition is one of the pioneering factors having an impact on the academic prowess of students. It is the fuel that propels a human being's routine activities be it physical or academic. This research essay has been developed to examine the impact of nutrition, commonly recognised as a panacea towards the enhancement of children's academic achievement. Research has proven that inadequate nutrition or nutritional imbalance inhibits normal cognitive development in students. This is attributed to the essential role of nutrition in exhibiting a direct effect on neurotransmitters, responsible for sending signals and messages from all parts of the body to the brain. This expository work aims to highlight the basic statistical figures of the current nutritional status of school-going children in India and Nigeria and the impact of Nutrition on cognition cum learning. The study also elucidates the existing nutritional policies and programs targeted at school children and throws light on its various successes and faultlines in the countries under study. It is finally followed by certain proposals and recommendations which are aimed at aiding various Governments and other nodal authorities to help ameliorate the nutrition levels of school-going children and by extension, their cognitive development.

Keywords: *nutrition, academics, cognitive development, students, policies, India, Nigeria.*

1.0 Introduction

“You are what you eat.”

This proverbial saying has been prevalent since time immemorial and rightly so. The importance of safe, ample and nourishing food in the lives of humans cannot be overstated. From impacting simple physiological changes like height and weight to the overall psychosocial and cognitive development, food, especially nutritive and of good quality, is of vital importance.

The significance of good and nutritive food and its role in a child’s physical and mental development and consequently, on academic performance is steadily being acknowledged around the world. But, there has been a noticeable inconsistency in the ability of nations to deal with this issue effectively. This stems from the fundamental disparity not just in the resources available at the disposal of the countries but also due to the discrepancy in the dissemination of research findings and allied data.

The UN Convention on the Rights of the Child, Article 24 states that “Children have the right to good quality health care, clean water, nutritious food and a clean environment so that they will stay healthy. Richer countries should collaborate with poorer countries to achieve this.” For any country to be able to thrive and for its youth to be able to drive the economy to its maximum potential, it is imperative to have access to adequate and nutritious food from the very beginning of life.

In contemporary society, particularly in the less developed countries like India and Nigeria, millions of children suffer from malnutrition. According to (United Nations, 2000), one-third of pre-school age children in less developed countries, that is a total of 180 million children under the age of 5, experience immense growth stunting and wasting. The prevalence of nutritional imbalance amongst the vulnerable, is extremely high. Needless to say, poor health and nutritional imbalance in school going children is detrimental to their intellectual functioning.

Therefore, there is an imminent need for policies and programmes that are aimed at bettering the health status of children which will eventually lead to advancement in students' cognitive and educational outcomes. Subsequent sections of this expository essay review some basic facts about the health and nutritional status of school-going children in India and Nigeria and how it affects their academic prowess. It provides a framework for a comprehensive analysis of existing policies present in the two countries under study to tackle

the issue at hand, analyzes statistical figures around various nutritional parameters and finally elucidates some suggestions on how health and nutrition of school-going children can be improved. This essay also leaves room for future research directions.

2.0 Definitions

1. Health: According to the Constitution of the World Health Organisation, Health is defined as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (World Health Organisation, 2020). GRO Brundtland, former Director-General of WHO has very rightly stated, “There can be no real growth without healthy populations. No sustainable development without tackling disease and malnutrition. No international security without assisting crisis-ridden countries. And no hope for the spread of freedom, democracy and human dignity unless we treat health as a basic human right.

There are a few essential pre-requisites or determinants of health (Mathur and Chadha, 2015, pp. 9) These include:-

- Achieving optimal growth and development and reflecting the full expression of one’s genetic potential.
- Maintenance of structural integrity and functional efficiency of body tissues necessary to lead an active and productive life.
- Mental well being. A person needs to be mentally stable and well-adjusted in order to be termed as a healthy individual.
- Ability to withstand the inevitable process of ageing with minimal disability and functional impairment.
- Ability to fight disease by resisting infections and the effect of environmental toxins and pollutants. A healthy individual is one who possesses a good immunity and whose body is able to tolerate environmental toxins without causing immense damage.

The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition. Governments have a responsibility for the health of their people which can be fulfilled only by the provision of adequate health and social measures.

2. Nutrition: Nutrition is defined as ‘The science of food, the nutrients and other substances therein: their action, interaction and balance in relation to health and disease’ (Mathur and Chadha, 2015, pp. 1). As is evident, people derive these nutrients from the food they consume. The science of Nutrition also includes various socio-economic, cultural and psychological factors associated with food and food-related habits as practised by the people.

Adequate nutrition is critical to the normal development of a child and is a fundamental requirement for positive health, functional efficiency and productivity (Chopra, 2015). It is the first line of defence against a plethora of illnesses which have the potential of leaving a detrimental effect for a long period of time. Children who are well-nourished throughout the beginning stages of their lives are bound to perform well in academics and grow up to become healthier adults. They can then break the cycle of undernutrition by offering a better start in life to their own children and go on to become more productive members of society.

3. Malnutrition: It is a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients. Absolute deficiency of nutrients results primarily from a low intake of that nutrient in the diet. Relative deficiency may arise when the nutrient, when present in the diet, is unable to be absorbed by the body due to one or more reasons. It is one of the most important factors in the loss of developmental potential for children, resulting in economic and social costs to both individuals and society (Chopra, 2015, pp 91). In developing countries, such as the countries under study - India and Nigeria, a large number of children are vulnerable to malnutrition and the ills it brings along, namely due to inequitable distribution of resources in the society. This eventually leads to lower than recommended intake of diet, increasing susceptibility to numerous infectious diseases and lack of appropriate care to tackle the aforementioned issues successfully.
4. Balanced Diet: A balanced diet is one that contains different types of food in such quantity and proportion that the need for energy, protein, vitamins and minerals is adequately met and a small provision made for extra nutrients to withstand the short duration of leanness (Mathur and Chadha, 2015, pp 7). Healthy dietary practices if started early such as breastfeeding fosters healthy growth and improves cognitive development, and may have long term health benefits such as reducing the risk of

becoming overweight or obese and developing non-communicable diseases later in life (World Health Organisation, 2020b). Regular consumption of a balanced diet helps to protect against malnutrition in all its forms, as well as non-communicable diseases (NCDs), including such as diabetes, heart disease, stroke and cancer.

The WHO (World Health Organisation, 2020b) also states that the energy intake (calories) should be in balance with energy expenditure i.e the body should be in a state of energy balance. Energy balance is a condition when the calories taken in from the diet are equal to the calories used by the body. To avoid unhealthy weight gain, total fat should not exceed 30% of total energy intake. Intake of saturated fats should be less than 10% of total energy intake, and intake of trans-fats less than 1% of total energy intake, with a shift in fat consumption away from saturated fats and trans-fats to unsaturated fats, and towards the goal of eliminating industrially-produced trans-fats.

Diet evolves over time and is influenced by various social and economic factors that interact with each other in a complex manner to shape individual dietary patterns. These factors include income, food prices (which will affect the availability and affordability of healthy foods), individual preferences and beliefs, cultural traditions, and geographical and environmental aspects (including climate change). The exact make-up of a diversified, balanced and healthy diet will vary depending on individual characteristics. (e.g. age, gender, lifestyle and degree of physical activity). Therefore, promoting a healthy food environment – including food systems that promote a diversified, balanced and healthy diet – requires the involvement of multiple sectors and stakeholders, including government, and the public and private sectors (World Health Organisation, 2020b).

5. Nutritional Status: As stated by Chadha and Mathur, it is the condition of health of the individual, as influenced by the utilisation of nutrients. It can be determined only by the correlation of information obtained through a careful medical and dietary history, a thorough physical examination, and appropriate laboratory investigations. Nutritional status is assessed by looking at the medical history of the individual, the diseases they are suffering from, and the kind and amount of different food they have been consuming habitually (Mathur and Chadha, 2015, pp. 6).

A physical examination would cover various body measurements like height, weight, waist circumference, mid-upper arm circumference etc which help to assess whether the individual is obese or underweight. Furthermore, it includes

measurements such as blood pressure and a visual examination for symptoms of deficiencies of various nutrients. Additionally, the hair, teeth, skin, eyes, gums, nails and thyroid gland are also examined for clinical signs that may indicate a problem (Mathur and Chadha, 2015, pp. 6)

The factors affecting an individual's nutritional status are many and diverse. Understanding these factors is essential in order to assess malnutrition, to design programmes which tackle nutrition problems, and to correctly inform programme management and evaluation. Besides being morally unacceptable, this implies economic costs, in terms of lost productivity and income caused by premature death, lower physical capacity, absenteeism and lower educational and occupational opportunities. (European Union, 2007, p. 2)

6. Academic performance: The Collins' Dictionary defines the word 'academic' as the word used to describe things that relate to the work done in schools, colleges, and universities, especially work which involves studying and reasoning rather than practical or technical skills.

Academic performance of students is the core of the contemporary education system. Students are expected to strive towards portraying exemplary academic performance as it is believed to open the window of better career opportunities and a more settled future. In the educational context, academic performance is the educational goal to be achieved by a student, teacher or institution over a certain period and is measured either by examinations or continuous assessments. Academic performance is the outcome of education and the extent to which a student, teacher or institution has achieved their educational goals (Narad & Abdullah, 2016, p. 18).

In no doubt, students are the central focus of all educational enterprises. Several factors impact the academic achievement and prowess of students. Educational facilities, also known as learning facilities, are the equipment provided to students so that they can use every opportunity to develop full potential. It is quite obvious that in contemporary society, particularly in less developed countries, most elementary, secondary and even tertiary institutions tremendously lack quality learning facilities. Science students in most schools have no laboratory resources or equipment to aid them in carrying out efficient practical work and undertake projects to enhance their academics. Research has shown that students tend to

learn and understand concepts easily when the theoretical framework is complemented with practical aids. School going children who are not privileged to access laboratory facilities are thus not able to understand most scientific concepts and theories which consequently affects their cognitive development.

3.0 Background of countries

1. India

India is a country located in South Asia, its capital being the city of New Delhi. Its history and culture is dynamic, spanning back to the beginning of human civilization. It attained independence from the British colonial rule in 1947. The present-day government of India is a constitutional democratic republic, one that represents a highly diverse population consisting of a large number of ethnic groups with their own indigenous languages. India is the second-most populous country, after China and is home to a sixth of the world's population. Around 68.84% of this population resides in the rural areas while around a third of the population, roughly 31.16%, is nestled in an urban setup. (Census of India, 2011) Rural economy constitutes 46 per cent of national income. Despite the rise of urbanisation more than half of India's population is projected to be rural by 2050 (Chand et al., 2017, p. 4). Thus growth and development of rural economy and population are a key to overall growth and inclusive development of the country. 63.3% people in Rural India can not afford the cost of a recommended diet - Rs. 45.1 for women and Rs. 51.3 for men, while 76.2% people in rural India can not afford the cost of a recommended diet after accounting for non-food expenditure (Raghunathan et al., 2020, p. 1).

India is also the fifth largest economy in the world by nominal GDP along with being the fastest growing trillion dollar economy of the world. (World Economic Outlook Database, IMF, 2019) The economy of India is primarily agrarian - which is to say that most of the population are directly or indirectly dependent on agriculture. According to the, 'Global Social Mobility Report 2020: Equality, Opportunity and a New Economic Imperatives' by the World Economic Forum, some 220 million Indians sustained on an expenditure level of less than Rs 32 / day — the poverty line for rural India — going by the last headcount of the poor in India in 2013 (World Economic Forum, 2020). According to the report, Indians born in low-income families would take seven generations to even approach the country's mean income. The report states that "Despite a significant decrease in the percentage of people

living in absolute poverty, there are several areas for improvement for India to provide more equally shared opportunity to its population” (Mahapatra, 2020).

2. Nigeria

The name 'Nigeria' originated from the River Niger running through the country and is located in West Africa. In late 1901, Nigeria became a British protectorate. The colonization period lasted until 1960, when the movement for independence succeeded. It has more than 150 million people making it the most populous country in Africa. Nigeria's population is expected to grow up to 440 million, which will make it to become the third most populous country in the world after India and China (Population Reference Bureau, 2013).

It has one of the biggest democracies in the world and operates on a presidential system of government. It has a dual economy, based on its rich natural resources (oil, gas and minerals), traditional agriculture and the trade sector. The country in no doubt has a very rich land of diverse cultural heritage, having more than 250 ethnic groups, a wide array of religions and sophisticated visual arts. The creativity, talent, music, sculptures, films and literature found during its festive seasons are well known all over the world (About Nigeria, 2006).

In the economic sector, Nigeria has the largest economy in Africa, with a Gross domestic product (GDP) greater than USD 500 billion and steadily grew to over 7 per cent per annum between 2005 and 2014, but this growth has been slower in 2015 (about Nigeria, 2006). Its economy is actually more diversified, with the oil sector contributing only 14% of the GDP. Nigeria's unemployment rate increased tremendously from 18.8 per cent in the year 2017 to 23.1 per cent in the third quarter of 2018, (National Bureau of Statistics). According to the World Bank report, as of 2018, Nigeria's population growth rate is higher than its economic growth rate which makes the unemployment rate rise up to 23.1%, thus making almost half of the country's population live below \$2 per day.

4.0 Current Nutritional Status in India

According to the United Nations Statistics Division Demographic Yearbook (2018), 31.39% of the population of India is between the age of 5-19 - the ages between which a child begins and graduates school (United Nations Statistics Division, 2018). Additionally, around 9.32% of the population is under 5 years of age - a period of phenomenal, physical,

social, intellectual and emotional development. It thus becomes increasingly essential to meet the nutritional needs both quantitatively and qualitatively in order for the child to become a healthy functioning individual.

The first 2 years after birth, also known as the first 1000 days of life are known as the “Brain’s window of opportunity.” It is a unique period wherein the foundations of optimum health, growth and neurodevelopment across the lifespan are established (Cusick & K. Georgieff, n.d.). Insufficient supply of nutrition during this crucial period of time thereby weakens this foundation, leading to earlier mortality and significant morbidities such as poor health, and more insidiously, substantial loss of neurodevelopmental potential.

In the Indian context, a nutritious diet is one that meets India’s national dietary guidelines. (National Institute of Nutrition 2011). The following 15 dietary guidelines provide a broad framework for appropriate action (N.I.N., & I.C.M.R. (n.d.). Dietary Guidelines for Indians (2nd ed.). National Institute of Nutrition):

1. Eat a variety of foods to ensure a balanced diet.
2. Ensure the provision of extra food and healthcare to pregnant and lactating women.
3. Promote exclusive breastfeeding for six months and encourage breastfeeding till two years or as long as one can.
4. Feed home-based semi-solid foods to the infant after six months.
5. Ensure adequate and appropriate diets for children and adolescents, both in health and sickness.
6. Eat plenty of vegetables and fruits.
7. Ensure moderate use of edible oils and animal foods and very less use of ghee/ butter/ vanaspati.
8. Avoid overeating to prevent overweight and obesity.
9. Exercise regularly and be physically active to maintain ideal body weight.
10. Restrict salt intake to the minimum.
11. Ensure the use of safe and clean foods.
12. Adopt right pre-cooking processes and appropriate cooking methods.
13. Drink plenty of water and take beverages in moderation.
14. Minimize the use of processed foods rich in salt, sugar and fats.
15. Include micronutrient-rich foods in the diets of elderly people to enable them to be fit and active.

According to the National Family Health Survey 4, 2015-2016, a mere 9.6% of children between 6-23 months of age receive an adequate diet. As a consequence of the preceding statistic, around 38.4% children under the age of 5 are stunted, which is to say that they have low height for their age while 21% of them are wasted, i.e have low weight for their height. Moreover, approximately 35.8% of children under the age of 5 have low weight for their age. Alarming, 58.6% of children suffer from anaemia, a major public health concern among adolescents. The consequences of Anaemia include impaired cognitive function, decreased work capacity, limited ability to concentrate and focus along with a compromised immune functioning (National Family Health Survey, 2016).

India's enrolment rate in primary education (class I-V) is comparable to that of developed countries. However, it falls behind these countries after class VI. In higher education, India's enrolment rate stands at 23%, as against about 87% in the US, 57% in the UK and 39% in China (*Trends in School Enrolment and Dropout Levels*, 2017). The dropout rate peaks at the secondary level (class IX-X) at 17%, as compared to 4% in elementary school (class I-VIII) and 2% in upper secondary school (class XI-XII). This is also reflected in the transition rates in school education where the lowest transition rate is at the secondary level (from class X to class XI) at 69%. Research has shown that health problems due to abysmal nutritional status in school children is among one of the major reasons for low school enrollment, high absenteeism, early dropout and unsatisfactory academic performance.

The lack of proper nutrition during the formative years of life thereby has a detrimental effect on the child's capability to grasp, analyse and retain new information. Chronic undernutrition in childhood is linked to slower cognitive development and serious health impairments later in life which also prove to be a barrier in between children achieving academic excellence. This cycle continues when the child starts going to school and consequently has a negative effect on their academic prowess.

4.1 Current Nutritional status in Nigeria

According to Duyar and Perlin C, undernutrition is a major public health challenge affecting the academic prowess of school-going children. Nigeria is one of the sub-Saharan African countries severely affected by child malnutrition. Studies conducted by Sarma MSWD, have shown that malnutrition is common among school-age children; the report shows that stunting ranges from 11 to 48.7% and underweight from 7.2 to 59.7%.

Globally, in 2015, 159 million children at the age of 0- 5 were estimated to be stunted and more than a third of these live in Africa (WHO UNICEF, 2015). In Nigeria precisely, 33% of school-going children under the age of five were stunted, 19.4% were underweight while 7.2% had moderate acute malnutrition in 2015 (National Bureau of Statistics). The research carried out by P (Obiakor, 2014, p. 1), reported that undernutrition accounted for about half of all child deaths in Nigeria.

Moreover, in one of the cities in Nigeria known as Ebonyi State, between the year 2013 and 2015, the percentage of school-going children from elementary to high school who were chronically undernourished rose from 16.2 to 20.6%, in separate national surveys (National Bureau of Statistics and National Population Commission Abuja, 2014). Going forward, the results of the survey carried out by (Adanna Antonia Umeokonkwo et al, 2020) on "Nutritional status of school-age children in Abakaliki metropolis, Ebonyi State, Nigeria" shows that stunting was found to be higher among pupils who were attending public schools (11.8%) compared to those attending private schools (2.5%). The survey showed that the prevalence of stunting was 19.3% among the children residing in rural areas and 5% to the pupils residing in urban areas of the metropolis. The work concluded that under and over nutrition existed in Abakaliki metropolis. According to the UN Office for the Coordination of Humanitarian Affairs (2014), Nigeria has the second-highest acute malnutrition burden in the world, with an estimated 3.78 million children suffering from wasting.

It is a fact that under-nutrition causes immune dysfunction in elementary and high school students, which can subsequently lead to cognitive dissonance or impairment, thereby reducing physical capacity. A child who is malnourished has a higher risk of having neurocognitive delay, poor school performance, early school drop-out (Srivastava A, et al,) and therefore is more likely to have poor work productivity, earning potential and will contribute less to the nations GDP later in life (Sanbanjo IO, et al,). In addition to this, the estimates made by the Global Nutrition Report attenuated that malnutrition causes a huge economic loss of about 11% of GDP per year in Africa and Asia (International food policy research institute, 2016). A comprehensive programme to improve nutritional status is recommended as part of a well-funded school health programme.

5.0 Impact of Nutrition on cognition and learning

There has been a lot of research focussed around the relationship between nutrition and healthy brain activity. Numerous studies have proven the impact of dietary foundations on normal brain functions. Gómez-Pinilla (2008) has stated that neural circuits that are involved in feeding behaviour have shown precise coordination with brain centres that modulate energy homeostasis and cognitive function. Interestingly, the effects of food on cognition and emotions can start before the act of feeding itself, as the recollection of foods through olfactory and visual sensory inputs alters the emotional status of the brain. The ingestion of foods triggers the release of hormones or peptides, such as insulin and peptides into the circulation which then reach the brain and activate signals to promote synaptic activity and contribute to learning and memory (Gómez-Pinilla, 2008).

While the human brain continues to develop and change throughout life, the most rapid period of brain growth is in the last trimester of pregnancy and the first two years of life. This period includes rapid rates of neuronal proliferation (cell numbers), growth and differentiation (complexity), myelination, and synaptogenesis (connectivity). Thus, this time period harbours the greatest opportunity to provide optimal nutrition to ensure normal development and also the time of greatest brain vulnerability to any nutrient deficit (Cusick & K. Georgieff, n.d.).

Erickson J (2006) has pointed out some key components essential for efficient brain functioning of school-going children. These substances can all be attained through a healthy dietary pattern (Northern Michigan University, 2010, p. 9, 2010, p. 9). He identified proteins to be necessary for brain functioning since they are used in the formation of the body's tissues, including neurotransmitters, earlier identified as chemical messengers that carry information from brain cells to other brain cells. A lack of protein, also known as Protein Energy Malnutrition was shown to lead to poor school performance by children. The children were also shown to be lethargic, withdrawn, and passive, all of which exhibits detrimental impacts on social and emotional development (Northern Michigan University, 2010, p. 9, 2010, p. 9).

Yet another essential component identified were carbohydrates, which are commonly found in grains, fruits, and vegetables. These break down into glucose (sugar) which is where the brain gets its energy. Fluctuating levels of carbohydrates may cause dizziness and mental confusion, both of which can affect cognitive performance. Eating a carbohydrate-heavy

meal can cause one to feel more calm and relaxed because of a brain chemical called serotonin and its effect on mood (Northern Michigan University, 2010, p. 10-12) .

Erickson also noticed that fat makes up more than 60% of the brain and acts as a messenger in partial control of aspects such as mood. Omega-3 fatty acids are very important to the optimum performance of the brain and a lack of these fats can lead to depression, poor memory, low IQ, learning disabilities, dyslexia, and ADD (Northern Michigan University, 2010, p. 10-12).

The author also discussed the importance of vitamins and minerals as an essential prerequisite for the functioning of the brain, particularly vitamins A, C, E, and B complex vitamins. Magnesium, manganese, sodium, potassium and calcium play a role in normal brain functioning, message transmission and the thinking process (Northern Michigan University, 2010, p. 9, 2010, p. 9).

The brain neurons send signals to other cells following a mechanism that involves the release of particular chemicals known as neurotransmitters. These are produced in and released from the terminal of each neuron. Research has shown nutrition to be important in the production of key neurotransmitters such as acetylcholine, dopamine, and serotonin. According to Dr Richard Wurtman, the nutrients in foods are precursors to neurotransmitters, and the amount of neurotransmitter that is produced would depend on the food eaten. Thus, these food constituents would also modify brain functions mediated by these transmitters (Wurtman, 2009, p. 3).

Research as cited by Soleimani & Abbaszadeh, (2011, p. 1880) show that children and teens who have received less iron, scores much lower in intelligence tests relatively. In addition, other researchers showed that low serum iron, decreased IQ, precision, concentration and learning in school-age children, and iron supplementation in children, can increase their scores of intelligence and academic tests. Obvious differences observed in students with iron deficiency compared with healthy students in terms of doing homework, sensory abilities, physical abilities, attention and concentration, learning ability and memory capacity (Soleimani & abbaszadeh, 2011, p. 1881).

Yet another research was undertaken to assess how nutrition affects learning and behaviour and suggested that diet can influence cognition and behaviour in many ways. About one-third of children who completed a food-habit questionnaire had inadequate fruit

and vegetable intake. These students also showed poor school performance as compared to those students who had an adequate intake of fruits and vegetables (Lahey & Rosen, 2010).

Malnutrition, when stated, is generally associated solely with undernutrition and its effects. However, malnutrition refers to an imbalance of one or more nutrients, thereby including overnutrition or obesity. Research has shown students who are overweight to have negative effects on their academic performance. Shore et al. (2008, p. 1536) found differences in non-overweight students and overweight students in the areas of academic achievement, attendance, discipline and scores. The GPAs of non-overweight students were about 11% higher than those of the overweight students. Additionally, Shore suggested overweight students have poor attendance and discipline when compared to those having a normal body weight.

Yet another research showed that obese adolescents scored lower than their classmates falling into the range of normal body weight across all content areas. Obese children scored lower in intelligence quotient (IQ), reading, spelling and arithmetic. These children also demonstrated shorter attention spans and decreased mental flexibility and tended to have lower estimated intellectual functioning, all of which may present challenges for children to exhibit satisfactory academic performances (Yau et al., 2012).

The provision of nourishing food in appropriate quantity and quality is imperative to lay down a strong foundation for the overall growth and development of a child, in every sphere of their life. The strong connection between nutrition and brain functioning, one that has been well established by extensive, well-formulated research needs to be used as the backbone for making policies aimed at enhancing the performance of children in academics.

6.0 Existing Policies and Programmes in India

Over the years, undernutrition has been framed as a health issue (1950-65), a problem of food shortage (1965-75), a multidimensional poverty challenge (1975-97), and a nutrition and food security issue (after 1997). It has always remained as one of the prime subjects of the various five-year plans (Saxena, 2020).

6.1 National Nutrition Policy, 1993

The National Nutrition Policy (NNP) aimed at drawing attention towards and performing key action in various areas that are conjugated in one or more ways with

nutrition. These include agriculture, food production, food supply, education, information, health care, social justice, tribal welfare, urban development, rural development, labour, women and child development. This policy also involved people with special needs along with focussing on monitoring and surveillance. This policy was divided into direct strategies (short term) and indirect strategies (long term).

Direct strategies demanded focus on the following (Saxena, 2020) :

- Ensuring proper nutrition of the target groups i.e. the vulnerable section of the society (children, adolescent, pregnant and nursing women, etc.)
- Expanding the safety net for children (i.e. expanding the policy to rural slums along with urban slums),
- Food fortification,
- Provisions for low-cost nutrition food, and
- Combating micro-nutrition deficiency in the vulnerable group.

Meanwhile, indirect strategies demanded focus on food security, providing nutritionally rich food at affordable costs, prevention of food adulteration, imparting nutrition education through improved means of communication and proper monitoring of nutrition programmes.

6.2 National Nutrition Mission or POSHAN Abhiyan, 2018

The Prime Minister's Overarching Scheme for Holistic Nutrition or POSHAN Abhiyaan or National Nutrition Mission, is Government of India's flagship programme to improve nutritional outcomes for children, pregnant women and lactating mothers. This scheme aims to build a people's movement (Jan Andolan) around malnutrition and intends to significantly reduce malnutrition in the next three years (*Poshan Abhiyan*, n.d.).

For the implementation of Poshan Abhiyaan, the four-point strategy/pillars of the mission are:

- Inter-sectoral convergence for better service delivery
- Use of technology (ICT) for real-time growth monitoring and tracking of women and children
- Intensified health and nutrition services for the first 1000 days
- Jan Andolan

6.3 National Food Security Act, 2013

This act involved a shift in the approach to food security from welfare to a rights-based approach. The Act legally entitled up to 75% of the rural population and 50% of the urban population to receive at least 5 kg of subsidized foodgrains under Targeted Public Distribution System. About two-thirds of the population therefore is covered under the Act to receive highly subsidised foodgrains. Additionally, this Act also aims to provide nutritional support to pregnant women and lactating mothers along with children aged 6 months to 14 years (National Food Security Act (NFSA), 2013, n.d.).

6.4 National Vitamin A Prophylaxis Programme, 1970

Prevalence of clinical and subclinical Vitamin A deficiency in India is among the highest in the world. In 1970, the National Prophylaxis Program against Nutritional Blindness was launched. It covers all children between the ages of 6 months and five years. Under this plan, about 2,00,000 IU of vitamin A was sought to be administered to all children once every six months. Consumption of vitamin A-rich food was also promoted under this scheme (National Vitamin A Prophylaxis Program | National Health Portal Of India, n.d.).

6.5 Special Nutrition Programme, 1970

The Special Nutrition programme was launched in 1970 by the Ministry of Social Welfare, Government of India. The objectives of the programme are to improve the nutrition of preschool children, pregnant and lactating mothers of poor socio-economic groups in urban slums, tribal areas and drought-prone rural areas. This program provides supplementary feeding of around 300 calories and 10 grams of protein to preschool children. It also covers nursing mothers and feeds them with 500 calories and 25 grams of protein. It takes place for six days in a week (Special Nutrition Programme (SNP), n.d.).

6.6 Balwadi Nutrition Programme, 1970

The Balwadi Nutrition Program was also launched in 1970. It is a program that focuses both on healthcare as well as education. Under this program, the Government of India seeks to supply food supplements to the Balwadis. The programme aims to supply about one-third of the calorie and half of the protein requirements of the pre-school child as a measure to improve nutritional and health status. It is meant for children who belong to the age group 3–6 years. It focuses on children of the rural areas and was launched under the aegis of the Department of Social Welfare (Balwadi Nutrition Programme (BNP), n.d.).

6.7 Integrated Child Development Services (ICDS), 1975

It is a program initiated by the Central Government in India and is India's response to the challenge of meeting the holistic needs of the child. The ICDS is one of the world's largest and most unique outreach programmes for early childhood care and development. It is a package of integrated services involving various parameters such as providing food, preschool education, primary healthcare, immunization, health check-up, and referral services to children under 6 years of age and their mothers. This program sees implementation at the grass-root levels through Anganwadi workers. The cooked items are being distributed to ICDS beneficiaries with the cost value of Rs. 2 /per beneficiaries per day (Integrated Child Developmental Services, n.d.).

6.8 National Iron Plus Initiative

The National Nutritional Anaemia Prophylaxis Programme (NNAPP) was initiated in 1970 as a measure to prevent anaemia in the country. The specific objectives of the programme were to:

- (i) assess the baseline prevalence of nutritional anaemia in mothers and young children through the estimation of Hb levels;
- (ii) give prophylaxis and treatment doses of IFA to mothers and children;
- (iii) monitor the quality of the tablets, distribution and consumption of the IFA supplements continuously;
- (iv) assess the Hb levels of the beneficiaries periodically
- (v) motivate the mothers to consume tablets through relevant nutritional education (and also to give the appropriate dose to their children).

The NNAPP programme was renamed as National Nutritional Anaemia Control Programme (NAACP) by the Ministry of Health & Family Welfare and further renamed as National Iron Plus Initiative in 2013 with the shift from prevention to the management of anaemia and on health and nutrition education activities, use of double-fortified salts and other iron and folic acid fortified food.

Despite the extensive schemes mentioned above to prevent iron-deficiency anaemia, the prevalence, across both rural and urban settings is alarming. According to the NFHS -4 data (2015-2016), 58.6% of children under the age of 5 suffer from anaemia while women between the age of 15-49 who are anaemic amounts to be around 53.1%.

6.9 National Iodine Deficiency Disorder Control Programme, 1992

This program started as the National Goiter Control Programme (NGCP). The program was later amended to include a more wide spectrum of iodine deficiency disorders like mental and physical retardation, deaf-mutism, cretinism, stillbirths, etc and renamed to National Iodine Deficiency Disorders Control Programme (NIDDCP) in August 1992. The objectives primarily include conducting surveys to understand the magnitude of iodine deficiency disorders and universalisation of iodine salt (National Iodine Deficiency Disorders Control Progr | National Health Portal Of India, n.d.).

6.10 Mid-Day Meal Scheme, 1995

The National Programme of Nutritional Support to Primary Education was launched on 15th August 1995, aiming at enhancing enrollment, retention and attendance and simultaneously improving nutritional levels among children. It was further extended to cover not only children in classes I -V of Government, Government aided and local body schools, but also children studying in EGS (Education Guarantee Scheme) and AIE (Alternative and Innovative Education) centres. Central Assistance under the scheme consisted of free supply of food grains at 100 grams per child per school day, and subsidy for transportation of food grains up to a maximum of Rs 50 per quintal (Mid Day Meal Scheme, n.d.).

The scheme was revised in 2004 to provide cooked mid-day meals with 300 calories and 8-12 grams of protein to all children studying in classes I – V in Government and aided schools and EGS/ AIE centres. Additionally, it included the provision of mid-day meals during summer vacation in drought-affected areas (Mid Day Meal Scheme, n.d.).

In October 2007, the scheme was further revised to cover children in upper primary (classes VI to VIII) initially in 3479 Educationally Backwards Blocks (EBBs). Around 1.7 crore upper primary children were included by this expansion of the scheme. From 2008, the programme covers all children studying in Government, Local Body and Government-aided primary and upper primary schools and the EGS/AIE centres including Madarsa and Maqtabas across the country. The calorific value of a mid-day meal at upper primary stage has been fixed at a minimum of 700 calories and 20 grams of protein by providing 150 grams of food grains (rice/wheat) per child/school day. Food norms had been revised yet again in 2009 to ensure a balanced and nutritious diet to children of the upper primary group by increasing the number of pulses from 25 to 30 grams, vegetables from 65 to 75 grams and by decreasing the quantity of oil and fat from 10 grams to 7.5 grams. (Mid Day Meal Scheme, n.d.).

The mid-day meal scheme has had a positive impact on the attendance, enrollment and retention power of students in school. A research conducted on the impact of the mid-day meal scheme in Balasore district in Odisha showed there has been a positive change on all the three parameters and an improvement has taken place on enrolment, retention and attendance of students. More importantly, it was noticed that students' learning ability particularly in the rural setups have been enhanced due to improvement in their nutritional status which helps them to concentrate and perform better in the classroom. This is due to the fact that these students either come from an economically weak background and go to school on an empty stomach which consequently proves to be detrimental to their process of concentration & learning (Panigrahi, 2018, p. 8).

However, there have been numerous instances wherein students and teachers have fallen ill after the consumption of mid-day meals due to careless handling of food and the lack of supervision on the ground to ensure proper safety, sanitation and hygiene (*Dead Rat Found in Midday Meal in UP, 8 Students and Teacher Fall Ill*, 2019).

Despite persistent efforts by the government to rid India from the evils of malnutrition and other related chronic illnesses, the situation on the ground remains quite concerning. Shweta Khandelwal, head, nutrition research, Public Health Foundation of India has stated - "India grapples with a malnutrition crisis despite having more than 30 government programmes and schemes for maternal and child health, and nutrition, under various ministries and departments that often operate in isolation."

The World Health Assembly (World Health Organization, 2018) in 2012 has laid down six nutritional targets aimed at improving the situation of maternal, infant and young child nutrition. These targets form the basis of deciding nutrition-based policies and goals in nations across the world. These targets are:-

1. Stunting: 40% reduction in the number of children under-5 who are stunted
2. Anaemia: 50% reduction of anaemia in women of reproductive age
3. Low birth weight: 30% reduction in low birth weight
4. Childhood overweight: No increase in childhood overweight
5. Breastfeeding: Increase the rate of exclusive breastfeeding in the first 6 months up to at least 50%
6. Wasting: Reduce and maintain childhood wasting to less than 5%

The World Health Assembly (WHA) released the Global Nutrition Report of 2020 (Global Nutrition Report | Country Nutrition Profiles - Global Nutrition Report, n.d.). It marks the progress of a total of 194 countries. Of these, India is one of the 88 countries that are not on track for achieving their 2025 targets. According to the report, India is among the top three countries along with Nigeria and Indonesia which are severely hit by malnutrition and stunting. The report elucidates that India is not even close to achieving four of the said targets, namely:

1. Stunting among children under the age of five years,
2. Anaemia amongst women of reproductive age,
3. Childhood overweight and obesity
4. Exclusive breastfeeding

Malnutrition is, admittedly, a complex, multi-dimensional issue impacted by a number of generic factors which include, but are not limited to poverty, inadequate food consumption due to access and availability issues, inequitable food distribution, improper maternal, infant and childcare practices, inequity and gender imbalances, poor sanitary and environmental conditions, and restricted access to quality health, education and social care services. Policies around the aforementioned need to be strengthened by the efforts of the government and various other organisations.

The close relationship between agriculture, nutrition and health is something that should be recognised and given due attention to. Agriculture is a source of food — and thereby nutrition — as well as of income that helps buy nutritious food. There is also a need for strengthening agriculture policies as they have a direct impact on food output, availability and prices (Chandrashekhar, 2019).

Progress in promoting nutrition is not uniform across the country, and is evidenced by stark variations in the nutritional status in different states. A tremendous shift in focus as well as attitudes is long overdue. There is thus an imminent need for dovetailing the various schemes and policies so they may lead to more fruitful results and for elevating the country out of the dismal state it is currently in.

7.0 Existing policies and programmes in Nigeria

Undernutrition has long been identified as a direct consequence of poverty and lack of basic nutrition education. The close relationship between these concepts "malnutrition and under-development" has continued to be emphasized. Adequate and proper nutrition is a *sine qua non* for cognitive learning cum economic development.

According to Country nutrition profiles, Nigeria has made no progress towards achieving the target for stunting, with 36.8% of children under 5 years of age affected, which is higher than the average for the Africa region (29.1%). Nigeria has made some progress towards achieving the target for wasting but 6.8% of children under 5 years of age are still affected, which is higher than the average for the Africa region (6.4%).

The general goal of Nigeria's Food and Nutrition Policy is to increase the nutritional status of all Nigerians, with much emphasis on the less- privileged and most vulnerable groups, like; children, women, and the elderly. The Food and Nutrition Policy aims to promote the following goals:

1. Establishment of a viable system for guiding and coordinating food and nutrition activities undertaken In the various sectors and at various levels of the society, from the community to the national level
2. Incorporating food and nutrition considerations into development plans and allocation of adequate resources towards solving the problems pertaining to food and nutrition at all levels
3. Promoting habits and activities that will reduce the level of malnutrition and improve the nutritional status of the population
4. Identifying of sectoral roles and assignment of responsibilities for the alleviation of malnutrition
5. Ensuring that nutrition is recognised and used as an important indicator to monitor and evaluate development policies and programmes
6. Promoting good, indigenous food cultures and dietary habits among Nigerian people for healthy living and development.

According to Sylvia et al, the Government of Nigeria has put a number of programmes and policies in place to address the issue of child malnutrition. These include:

7.1 The National Policy on Food and Nutrition (2016)

This is a major landmark in addressing the problem of malnutrition, which has had the most severe repercussions among young children, pregnant and lactating mothers. This policy has been made to strengthen the synergy among sectors and other government parastatals. It is expected that all other policies that have any bearing on food and nutrition should be updated in line with this policy.

7.2 The Food Security Bill (2015)

The general objectives of this program as formulated by a researcher "Amina Sharif", includes:

1. To improve food production, availability, and access to high-quality foods to meet the needs of the whole population.
2. To develop an effective monitoring system to enforce appropriate food laws for effective inspection and compliance.
3. To protect the consumers through improved food quality and safety

7.3 The National Plan of Action on Food and Nutrition in Nigeria (2004)

The following are the salient objectives of this program (Sharif, 2020) :

1. Enhancing a conducive macro-economic environment for addressing food and nutrition problems
2. Ensuring the incorporation of food and nutrition goals in Government development plans.
3. Developing an effective system for assessing, analysing and monitoring nutrition situations in the country

7.4 The Micronutrient Control Programme

This program aimed to disseminate Information, Education and Communication material for behavioural change to effect massive reduction in malnutrition.

7.5 The Baby-friendly Hospital Initiative

The specific objective of this program as stated by Amina Sharif is:

1. To improve the adequacy, accessibility, and utilisation of health services in the community
2. To promote, protect and support breastfeeding and adequate complementary feeding practices for the improved care of infants and young children in the context of key household practices.
3. To improve water supply, sanitation, and hygiene at the household level
4. To promote caring capabilities in community-based child care centres.
5. To promote caring capabilities within households and the community for other vulnerable groups.
6. To collaborate with other stakeholders to help improve access to maternal and newborn services.

The government has also enacted laws requiring the fortification of mass-consumed foods with vitamin A, iron and salt iodization (Sylvia et al). Consequently, the implementation of these policies and programmes remain a challenge. There is a persistently high level of child malnutrition in the country and stark disparities in nutritional status among children in different socio-economic groups and states (Sylvia et al).

8.0 Recommendations

The aforementioned points and their supporting data satisfactorily represent the pertinence of plausible nutrition and adequate nourishment for school going students and its implications on their academic prowess. A consideration of several pragmatic combative measures have been discussed below.

1. The Lancet Maternal and Child Nutrition Series introduced a comprehensive “Framework for Action” having three core components (The Lancet, 2013) :

- **Nutrition-specific interventions.** This directly addresses the immediate causes of child undernutrition, that is, inadequate dietary intake and poor health status. Examples being adolescent, preconception, and maternal health and nutrition; maternal dietary or micronutrient supplementation; promotion of optimum breastfeeding; complementary feeding and responsive feeding practices and stimulation; dietary supplementation and diversification or fortification for children

treatment of severe acute malnutrition; disease prevention and management; nutrition in emergencies (The Lancet, 2013)

- **Nutrition-sensitive interventions.** This includes interventions that incorporate nutrition goals and actions into interventions that address the underlying causes, which are - household food insecurity, poor quality of caring practices for mothers and children, and unhealthy living environments including hygiene and sanitation (Smith & Haddad, 2015, p. 197)
- **Building an enabling environment.** This addresses the basic causes related to the broad economic, political, environmental, social, and cultural context shaping children's nutrition (Smith & Haddad, 2015, p. 197)

The large number of policies and interventions that are currently being undertaken by the government in both India and Nigeria have done little to significantly improve the prevalence of malnutrition in the two countries. There is an imminent need to include a multi-sectoral approach - one that involves a convergence of nutritionally based programmes with other flagship programmes having a strong bearing upon nutritional outcomes. These include programmes focussed around health, water, sanitation, and gender (Rethinking Effective Nutrition Convergence: An Analysis Of, 2020). The committees in charge would need to :

- (i) develop a convergent action plan incorporating the elements of the framework
- (ii) conduct periodic reviews
- (iii) monitor and track progress of the actions in the plan
- (iv) facilitate efforts to achieve the targets

2. The removal of financial barriers would prove to be fruitful in addressing various nutritional concerns and affect their outcomes. This can be addressed via the promotion of conditional cash transfers and related safety nets. This would also lead to a promotion of access of families to health care and appropriate foods and nutritional commodities (The Lancet, 2013).

3. To scale up the implementation of set interventions, innovative delivery strategies, especially community-based delivery platforms should be formulated. They would prove to be an efficient and convenient way to reach households located in relatively inaccessible areas (The Lancet, 2013).

4. Targeted agricultural programmes and social safety nets can have a large role in the mitigation of potentially negative effects of global changes and man-made and environmental shocks, in supporting livelihoods, food security, diet quality, and women's empowerment, and in achieving scale and high coverage of nutritionally at-risk households and individuals. These are more successful when incorporated with strong behaviour change communications strategies and a gender-equity focus (The Lancet, 2013).

5. Compulsory inclusion of Nutrition education as a part of the school curriculum and the utilisation of behaviour change communication strategies focus on instilling a positive attitude toward healthy eating practices and behaviours. Undergraduate and postgraduate students with a relevant background should be involved in field visits to nearby villages to help impart nutritional education to those residing there. 'Health-promoting schools' in China have proven to be effective in raising awareness of students regarding the importance of consuming nutritious food, through combined efforts of health and education officials, teachers, students, parents and community leaders by fostering health and learning through improvements in school environments, policies and practices (Food, Nutrition and Agriculture - 33/2003, n.d.).

6. Parental counselling and schooling have consistently been associated with improved nutrition outcomes. Increased social support by the parents has been shown to facilitate a positive behavioural change. Active participation of the parents or guardians would go a long way in bringing the desired results (Koivisto Hursti & Sjöden, 1997, p. 106).

7. Involving corporates for looking into the nutritional requirements of a given number of villages, as can be obtained through a carefully curated directory of villages suffering from rampant malnourishment, under their Corporate Social Responsibility scheme. Asking companies to contribute to feeding the underprivileged by making it a part of their extensive CSR programmes, as well as partnering with non-governmental organisations involved in the same would result in a fruitful partnership towards solving the problem of hunger and starvation (G. Chopra, 2019).

8. Involving the expertise of celebrity chefs or top chefs from locally renowned hotels and restaurants to help oversee the mid-day meal preparations and have them teach and caution the staff involved in the programme about various health and hygienic measures to be

followed and practised while dealing with food. Strict checking and monitoring the quality and quantity of meals provided in the ICDS and Mid-day meal programme is paramount. Advances in health management information systems and novel technologies can help with real-time monitoring of nutrition outcomes and programme coverage and quality and should be researched (The Lancet, 2013).

9. Ensuring successful implementation and the universal coverage of the Public Distribution System targeting every family. A successful example of this can be seen in Tamil Nadu, India where technological interventions, innovative and fool-proof delivery mechanisms, constant reviews and fixing responsibility at each level ensured that an effective delivery system was in place to ensure the provision of subsidized food grains (Radhakrishnan, 2016). Additionally, the food to be distributed should be fortified with necessary vitamins and minerals to improve the micronutrient profiles.

10. Emulating the example of Japan and their belief of providing healthy and nutritious food of good quality in their canteens/ cafeterias for school going children in the private sector could prove to be effective in reducing the prevalence of childhood obesity. In Japan, the present school lunch program has been implemented under the "School Lunch Act" with the purpose of promoting the healthy development of the minds and bodies of school children (Fukuba, 1992, p. 155). School lunches with menus that are created by nutritionists are provided to all primary schools and the majority of junior high schools throughout Japan.

11. Programmes revolving around 'Food Security' - the provision of basic food to sustain life, appropriate in quantity and quality, should be modified to include and guarantee 'Nutritional Security'.

12. Adequate funds and grants to stimulate extensive research and collection of credible data that can be used by the government and other organisations to tackle challenges that may arise. Improved data is needed around various micronutrient deficiencies and other nutritional conditions globally. Moreover, research that involves the development and use of improved biomarkers to describe and understand nutritional conditions and increase knowledge of how they affect health and development is strongly needed. Such information would prove to be effective in helping countries prioritise and guide intervention programmes around the world.

Politicians and policymakers should prioritise investment in scale-up of nutrition-specific interventions and should maximise the nutrition sensitivity of national development processes. Efforts should be taken to ensure effective coordination between relevant sectors on a national and subnational level and should involve private sector engagement, resource mobilisation, and state accountability to its citizens (The Lancet, 2013).

9.0 Conclusion

After assessing and evaluating the role of nutrition on the academic prowess of school-going children, there is an imminent need to provide aid and assistance to the children affected by the primary causes of poor nutrition. An individual's nutritional lifestyle impacts his/her cognitive function and other development parameters which in turn, exert an influence on not only their academic but also their physical and mental well being.

This research essay highlights the various studies that have been undertaken and their results showing a direct impact of nutritional imbalance on the academics of students. There is an urgent need for effective changes to be made to the school system especially in elementary and secondary schools to provide students with healthy meals, adequate physical activity, and bring about nutritional education by conducting nutritional seminars aimed at sensitizing them on making the correct health choices for themselves.

When these areas are efficiently and pointedly addressed, the test scores, grasping proficiency, classroom performances and overall learning abilities will surge quite notably. Nonetheless, it is essential to understand that despite nutritional imbalance being a detrimental factor affecting students academic prowess as illustrated and reinforced by this study, it can be easily identified and dedicatedly reversed as indicated by Bryan et al in order to assist students to successfully realise their potential of cognitive processes and thereby making them valuable assets to their societies in particular and humanity at large.

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