

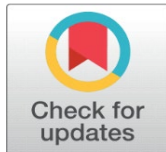
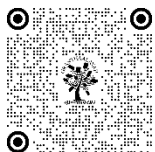
ROLE OF NUTRITION IN HUMAN CAPITAL DEVELOPMENT: AN EMPIRICAL STUDY IN THE INDIAN CONTEXT

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ABSTRACT

Health and nutrition form crucial elements of human capital development, where their relationship with human resource development is mutually reinforcing and cyclical. Nutrition, integral to both health and developmental outcomes, receives significant emphasis in the formation of human capital across developed nations today. This process commences during childhood, underscoring its foundational role in modern societal advancement. The physical health of an individual during the early stages of life plays a pivotal role in determining the quality of human capital. Proper nutrition is essential for sustaining and enhancing health, particularly in these formative years. During childhood, nutrition serves as the primary source of essential nutrients, including macronutrients and micronutrients, which are critical for growth and development. Moreover, proper nutrition during early life stages can reduce the risk of non-communicable diseases later in life, laying the foundation for healthier and more productive individuals as they grow. This underscores the importance of ensuring that children receive the necessary nutrients from a young age to promote their overall well-being and long-term human capital development. 213 respondents were considered in the study as a sample size. Mean and T-test was applied in the study to find the outcome.

Keywords: Health, Nutrition, Labour Force, Human Capital, Human Resource Development, Physical Health

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1. INTRODUCTION

Health and nutrition are vital components of human capital development. As income levels rise and poverty decreases, people gain access to better diets, improved healthcare, and healthier living conditions. Healthier individuals are able to channel their energy into both mental and physical productivity more effectively than those who are ill or undernourished. This enhanced productivity leads to increased economic output, higher income, and overall economic development. Today, many countries around the world place significant emphasis on the formation and enhancement of human capital as a key driver of societal progress. Human capital is a crucial element in the advancement of modern society, with health-preserving technologies playing a significant role in its development. These technologies, which are an integral part of biosocial innovations, focus on maintaining and enhancing health, thereby contributing to the formation of robust human capital. A fundamental aspect of health preservation is adherence to the principles of proper

nutrition. Instilling healthy eating habits, educating individuals on appropriate dietary behaviours, and cultivating taste preferences from an early age are essential for ensuring long-term well-being. By fostering these skills early in life, we lay the foundation for sustained good health, which in turn supports the development of a productive and capable population, vital for societal progress and economic growth (Belokurova & Pankina, 2018). Nutrition is the process by which food impacts the health and functioning of the body. Food is indispensable, providing the essential nutrients required for survival and supporting the body's ability to function effectively and maintain overall health. It consists of macronutrients—such as proteins, carbohydrates, and fats—that not only supply the body with calories and energy but also play vital roles in maintaining and regulating various bodily functions. In addition to macronutrients, food provides micronutrients, including vitamins and minerals, as well as phytochemicals. Although these substances do not contribute calories, they are crucial for numerous physiological processes that ensure the body operates at its best. For instance, vitamins and minerals support immune function, bone health, and cellular repair, while phytochemicals have protective roles that can reduce the risk of chronic diseases. The concept of health encompasses both physical and emotional well-being, representing a state of complete wellness. Healthcare systems are designed to help individuals maintain this state of optimal health. Among the various factors that contribute to good health, proper nutrition is one of the most critical. Maintaining a balanced diet, rich in essential nutrients, is key to improving and sustaining health over the long term. By making informed dietary choices, individuals can significantly enhance their well-being and reduce the risk of various health issues, ultimately leading to a healthier and more fulfilling life (Alex, 2020). The nutritional status and empowerment of women have profound effects on the physical and mental development of their children. Research highlights the critical role that nutrition plays in the well-being of both women and children within a household, emphasizing the significance of a mother's human capital. This model highlights the critical role that a mother's education and overall empowerment play in shaping the well-being and development of the entire household. Adequate nutrition is closely associated with better health outcomes for infants, children, and mothers. It supports the development of a strong immune system and contributes to safer pregnancies and childbirth (Houston & Huguley, 2014). Recognizing the critical importance of enabling children to reach their full growth and developmental potential, it is essential to provide them with all necessary prerequisites, particularly proper nutrition. Good nutrition is fundamental in nurturing vibrant, intelligent, and psychologically sound individuals whose proactive contributions can significantly boost the national economy and promote sustainable development. Nutrition involves making informed choices about the foods we consume. While there are various classes of food, the ability to select those that foster good health and personal well-being is what defines proper nutrition or a balanced diet. Adequate nutrition supports human growth and development, contributing to both physical and psychological progress across all stages of life. Moreover, the stability of mental health is closely linked to an individual's nutritional status, underscoring the importance of proper nutrition for maintaining mental well-being throughout life (Oguegbu, 2021).

2. LITERATURE REVIEW

Azhani, Yusmarwati & Pua (2015) highlighted that development of human capital with exceptional mental and physical fitness is crucial for producing the productive assets of a nation. Nutrition is important for human development, supporting the healthy growth of human capital across physical, emotional, spiritual, and intellectual dimensions. A balanced diet is essential for nurturing the physical and mental capabilities of students, crucial in shaping future generations with exceptional intellect and fostering a community of excellence in education and social interactions. The significance of nutrition in this process cannot be emphasized enough, as it forms the foundation of healthy eating habits essential for moulding children's minds and bodies. This not only enhances their cognitive abilities and academic performance but also supports their emotional and physical well-being. By focusing on nutrition as a key element in food consumption, we lay the foundation for a healthier, more capable, and productive society, poised to contribute to the country's long-term growth and development.

Martorell et al. (2010) stated that improved nutrition during early childhood significantly enhances human capital, influencing factors such as body size, work capacity, and intellectual functioning. These enhancements in adult human capital led to increased economic productivity, making a compelling case for prioritizing nutrition improvements among pregnant women and young children. By intervening early through improved nutrition, societies can potentially achieve substantial gains in both individual well-being and overall economic development. This underscores the critical role of nutrition interventions in shaping future generations' health and productivity, thereby fostering sustainable socio-economic growth.

Rode (2023) found that development of robust human capital, encompassing both mental and physical fitness, is essential for cultivating a nation's productive assets. Among the key factors influencing human development, food plays a pivotal role in ensuring the healthy growth of human capital across physical, emotional, spiritual, and intellectual dimensions. A balanced diet is therefore vital in nurturing the physical and mental capabilities of students, who are the architects of the next generation. By fostering first-class intellects and well-rounded individuals, a balanced diet contributes significantly to the formation of a community dedicated to excellence in education and social life. The future success of any nation hinges on the quality of its human capital—both in terms of intellectual prowess and the strength of character. Investing in the nutritional well-being of students is a direct investment in the nation's future, as it equips individuals with the cognitive and emotional tools necessary to drive innovation, sustain economic growth, and build a prosperous society. A well-nourished population is better positioned to achieve academic excellence, demonstrate leadership, and contribute positively to the social fabric, thereby laying the foundation for a thriving, resilient nation. A balanced diet plays a crucial role in cultivating such qualities within the workforce, positively impacting their productivity and enabling them to meet the standards of excellence, such as agility, precision, and career success. Therefore, adopting a lifestyle that includes a balanced diet is vital for sustaining the health and vitality of human capital. This approach not only supports personal well-being but also fosters a thriving, effective workforce that drives economic and social advancement.

Ohuruogu, Chinyere & Njoku (2019) revealed that nutrition is a critical factor throughout the human life cycle, from the moment of conception to the end of life. It begins with fertilization and continues to play a vital role through all stages of growth, development, and aging. The influence of nutrition extends beyond mere sustenance; it can also impact genetic expression and overall health. Adequate nutrition is essential for life maintenance, alongside the basic needs for water and oxygen. Food provides the energy necessary to sustain bodily functions and supplies the building blocks required for cell growth and repair. Meeting nutritional needs is crucial not only for immediate health but also for long-term survival and well-being. Throughout the human life cycle, diet significantly influences health outcomes. Food preferences, shaped by personal likes and dislikes, largely determine dietary choices and patterns. To reach their full genetic potential and ensure optimal health, individuals must meet their nutritional requirements at every life stage. Proper nutrition supports physical and cognitive development, promotes healthy aging, and contributes to overall longevity. Achieving optimal nutrition is key to unlocking the body's full potential and maintaining health across the lifespan. This comprehensive approach to nutrition ensures that individuals are well-nourished from conception through old age, supporting their growth, development, and overall quality of life.

Anton-Paduraru, Drochioiu & Teslariu (2016) found that nutrition plays a crucial role in the development and functioning of the brain throughout various stages of life, including fetal development, infancy, and childhood. The impact of diet on cognitive development is profound and starts from early pregnancy. Nutritional support for pregnant women is essential from the onset of pregnancy to ensure optimal brain development in the fetus. This includes strategies such as preventing prematurity and fostering a healthy gut microbiome in infants through natural birth and breastfeeding. Nutrition is not just a source of energy but also an environmental factor that can influence genetic expression, particularly in the brain. It can modulate how genetic factors are expressed, affecting brain development and function. Furthermore, nutrition has direct effects on gene expression in the brain, highlighting its critical role in shaping cognitive abilities. The concept of "brain food" underscores the significance of nutrition in supporting brain health and cognitive function. A well-balanced diet provides the necessary nutrients for brain development, energy supply, and overall cognitive performance. Ensuring proper nutrition from early stages of life is vital for maximizing brain potential and supporting lifelong cognitive health.

Irmak (2020) stated that good nutrition is a crucial component of leading a healthy life. When combined with regular physical activity, a balanced diet helps maintain a healthy weight, reduces the risk of chronic diseases such as heart disease and cancer, and promotes overall well-being. The relationship between our diet, the nutrients we consume, and our health has significant implications for both individuals and society. As dietary habits evolve, they place an increasing burden on healthcare systems. To address these challenges, it is essential to develop new products, interventions, and refined dietary guidelines that can enhance health through improved nutrition. Achieving this goal requires a thorough understanding of the biological processes that link the foods we eat to our long-term health. There is immense potential to develop innovative products, health interventions, and more precise dietary guidelines that could significantly improve health outcomes. However, fully realizing this potential necessitates a comprehensive understanding of how

our food impacts our health. By gaining deeper insights into these connections, we can better harness the benefits of nutrition to enhance public health and well-being.

3. STUDY'S OBJECTIVES

1. To know about the Role of Nutrition in Human Capital Development.
2. To ascertain how and why Nutrition is important for Human Capital Development.

4. METHODOLOGY OF THE STUDY

Nature of study is empirical. 213 is the sample size. Structured questionnaire was prepared to collect the data. Mean and t-test was applied to find the outcome of research. Convenience sampling is the method of sampling.

5. RESULT OF DEMOGRAPHICS

Table 1. Show respondent's gender details, 51.64% are male, and 48.36% are female. Looking at the Age of respondents, 16 - 20 years are 32.39%, 20 - 25 years are 38.03%, and those who are above 25 years are 29.58%. With regards to Income group, low-income group are 23.94%, middle-income group are 41.78%, and high-income group are 34.28%.

Table 1: Details of Participants

Variables	Number of Respondents	%
Gender		
Male	110	51.64
Female	103	48.36
Total	213	100
Age		
16 - 20 years	69	32.39
20 - 25 years	81	38.03
Above 25 years	63	29.58
Total	213	100
Income Group		
Low-income group	51	23.94
Middle-income group	89	41.78
High-income group	73	34.28
Total	213	100

Table 2. Role of Nutrition in Human Capital Development

Serial No.	Statement of Survey	Mean	T-Value	Sig.
1.	Essential nutrients such as iron, iodine, zinc, and vitamins A, B, C, and E are crucial for brain development and function	4.31	19.455	0.000
2.	Malnutrition, deficiencies in nutrients, can impair cognitive abilities, learning capacity, and school performance	4.21	18.084	0.000
3.	Nutrition impacts physical growth, bone development, and overall health	4.27	19.283	0.000
4.	Undernutrition can result in stunted growth, weak immune systems, and a sensitive vulnerability to diseases	4.13	16.811	0.000
5.	Well-nourished people are more likely to achieve higher educational attainment, participate actively in the workforce	3.15	2.268	0.012
6.	Proper nutrition supports optimal health throughout the lifespan, reducing healthcare costs and enhancing overall well-being	4.23	18.286	0.000
7.	Proper nutrition supports healthy birth weights, reduces the risk of developmental delays, and enhances cognitive abilities	3.17	2.551	0.006
8.	Enhances ability to learn, comprehend, and retain information, essential for educational success and human capital development	4.11	16.731	0.000
9.	Nutrition impacts mood, behaviour, and mental health	4.01	15.041	0.000
10.	Proper nutrition supports emotional resilience and social interactions, contributing to overall psychological well-being and social capital	3.19	2.879	0.002

Table 2 shows mean value of "Role of Nutrition in Human Capital Development". First statement of the survey was Essential nutrients such as iron, iodine, zinc, and vitamins A, B, C, and E are crucial for brain development and function,

it has scored the mean value of 4.31, second statement talks about deficiencies, Malnutrition, deficiencies in nutrients, can impair cognitive abilities, learning capacity, and school performance has the mean value of 4.21. Third statement is about nutritional impact, Nutrition impacts physical growth, bone development, and overall health scored the mean value of 4.27, Undernutrition can result in stunted growth, weak immune systems, and a sensitive vulnerability to diseases is the fourth statement of survey with the mean score of 4.13, next statement is Well-nourished people are more likely to achieve higher educational attainment, participate actively in the workforce with the mean of 3.15, Proper nutrition supports optimal health throughout the lifespan, reducing healthcare costs and enhancing overall well-being is the sixth statement having the mean score of 4.23. Proper nutrition supports healthy birth weights, reduces the risk of developmental delays, and enhances cognitive abilities (mean 3.17), and Enhances ability to learn, comprehend, and retain information, essential for educational success and human capital development (4.11) are seventh and eighth statements of survey. The last two statements are Nutrition impacts mood, behaviour, and mental health and Proper nutrition supports emotional resilience and social interactions, contributing to overall psychological well-being and social capital with the mean score of 4.01 and 3.19 respectively. T-value of survey statements in context of Role of Nutrition in Human Capital Development are identified as significant as t-value of all statements are positive and significant as significant value is less than 0.05.

6. FINDINGS AND CONCLUSION

In the Indian context, enhancing nutritional practices can significantly improve both individual and societal outcomes. This study underscores the importance of comprehensive nutritional strategies and policies to foster human capital development and stimulate economic growth. The study delves into the critical role of nutrition in human capital development within India, examining how nutritional status impacts cognitive development, physical health, and economic productivity. By analysing empirical data, it highlights the profound influence of nutrition on enhancing human capital and offers actionable strategies to improve nutritional interventions in the country. Human capital development is crucial for economic growth and societal advancement. In India, with its diverse socio-economic landscape, nutrition is key to shaping human capital. This study explores the relationship between nutrition and human capital development, emphasizing how better nutritional practices can lead to enhanced outcomes at both the individual and societal levels. T-value of survey statements in context of Role of Nutrition in Human Capital Development are identified as significant as t-value of all statements are positive and significant as significant value is less than 0.05.

The disparity in Human Capital between more developed and less developed regions highlights significant inequalities in development. These differences reflect how variations in early-life nutrition can contribute to uneven growth and opportunities across regions. To address this issue effectively, it is essential to reassess our priorities and adopt strategies that balance immediate assistance with long-term planning. By combining urgent support for current needs with strategic actions aimed at achieving sustainable outcomes, we can break the persistent cycles of poverty, malnutrition, poor health, and inadequate education. Such an approach will enable low- and middle-income communities to gradually improve their Human Capital, fostering better health, education, and economic opportunities in the future. This comprehensive strategy ensures that nutritional investments not only address immediate deficiencies but also build a foundation for enduring societal progress.

Cognitive development, which involves thought processes and the behaviours reflecting them, is a key aspect of human development. The glycemic index (GI) is crucial for brain health, as the brain relies heavily on a continuous supply of glucose to fuel its high metabolic activity. Glucose serves as the primary energy source for neurons, and maintaining stable glucose levels is essential for supporting cognitive function and overall brain performance. The hippocampus requires a steady influx of glucose to maintain the processes underlying memory formation, information retention, and cognitive tasks. When glucose levels drop or spike too quickly, it can lead to impaired cognitive abilities, reduced focus, and diminished memory recall. Foods with a low glycemic index release glucose slowly into the bloodstream, providing a steady and sustained energy supply to the brain. This gradual release helps prevent sharp rises and falls in blood sugar levels, promoting consistent cognitive performance and reducing the risk of mental fatigue or mood swings.

CONFLICT OF INTERESTS

None

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None

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