



Nutrition impact on academic performances of primary school children

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ABSTRACT

Researches say, children who miss schools frequently, often fall behind. Regular attendance is generally considered a prerequisite for attaining desired academic learning level (Aucejo & Romano (2016); Gottfried (2010, 2011); Gottfried & Kirksey (2017); Kirksey (2019); Morrissey et al., (2014). A major cause of school absenteeism in the government schools located in urban areas like Delhi is health issues caused by low immunity and nutritional deficiencies. UNICEF in its report published in May 2022 mentioned that children below the age of five in India are severely affected by malnutrition, which is the most in the world. Psychologists believe that development in all aspects is interrelated across the domains. Students' growth is directly affected by their nutrition, which in turn is influenced by the socioeconomic status and nutritional awareness. Nutritional deficiencies impact the academic performances of children (Michelle D. Florence, Mark Asbridge, Paul J Veugelers 2008). This research paper tends to draw the relational impact of nutritional deficiencies on educational performances and school absenteeism in students. It is a comparative study of primary school children from a government and a private school. The data was collected using a questionnaire, which was followed up by a focused group discussion with children. An interview of in-service school teachers was also conducted to validate the findings of the research. Therefore, this study assesses nutritional health and food accessibility among students. This study also critically analyses the mid-day meal scheme of the government and explores the gap between the idea and its implementation.

Keywords: Nutrition, Absenteeism, Academic achievement, Primary School Children, Mid-day Meal

Introduction

In year 2022, India ranked 107th out of the 121 countries in the Global Hunger Index. The index is calculated on a 100 point scale with 0 representing no hunger or zero hunger. The annual report of GHI is collaboratively published by an International humanitarian organization from Ireland, Concern Worldwide and Germany's non-profit organization Welthungerhilfe. The scores are calculated on the four indicators – Undernourishment (percentage of population with insufficient Calorie intake), Child Stunting (percentage of children under the age of 5 with low height for their age), Child Wasting (percentage of children under the age of 5 with low weight for their height) and Child mortality of children under the age of 5. The calculated score of India is 29.1, which indicates serious level of hunger. The detailed analysis of scores showed that undernourishment of Indian children have risen as compared to previous years, and 22.43 crore people in India are considered undernourished. As per UNICEF Report (Wasting In Children Under 5, UNICEF-

WHO-WB Joint Child Malnutrition, JME, May 2022), "India has 5,772,472 (five million seven hundred seventy-two thousand four hundred seventy-two) children below five years affected by severe wasting (malnutrition) that is the most in the world". The situation has been called as an 'overlooked child survival emergency' by the global body.

Malnutrition among children may lead to lower immunity, and children frequently fall sick thus, miss school. It was found by many researchers that children who miss school on a regular basis tend to fall behind in their academic performance. Academic performance of children in early years impact their future educational achievements and health and has therefore come out as a public health concern. Reid (2005) found that on being absent from school, "children miss out on assignments and as a result, they are more likely to underachieve or perform poorly". Absenteeism is recorded as total number of days of school missed, it includes both excused and unexcused absences (Balfanz & Byrnes, 2012). Does malnutrition in children affect their health? Does malnutrition and poor health affect children attendance in the primary schools? Does this affect their performance and learning in the primary schools? These questions bothered the researchers.

The Constitution of India makes the Right to Food a guaranteed Fundamental Right which is enforceable by virtue of the constitutional remedy provided under Article 32 of the Constitution. The National Food Security Act of 2013 covers two thirds of the population of the country wherein heavily subsidised food grains are provided. It is being implemented throughout the country, covering all states and union territories. There are other campaigns run by government like 'Eat Right India Movement' of FASSAI, Poshan Abhiyan (National

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Nutrition Mission) of the Government of India, Pradhan Mantri Matru Vandana Yojna, earlier known as Mid-day meal scheme in the government (public) schools.

The Mid-day Meal Scheme (MDMS) is considered to be the largest school meal program in the world. MDMS was first introduced by Tamil Nadu in 1955 and was recorded to have the most considerable increase in the number of children enrolling in schools. This scheme was renamed as Pradhan Mantri Poshan Yojna or Pradhan Mantri Poshan Shakti Nirman which extended the scheme from hot cooked meals to children studying in pre-primary levels or Bal-Vatika in addition to the already covered scheme. The revamped scheme focussed on monitoring the nutritional levels of students by the nutritional expert.

Research Questions:

The following questions are explored through this research:-

- Does nutrition actually effect academic scores or learning outcomes of Primary school students?
- Does the socio-economic status of students influence their academic achievements?
- Is there any relation among school absenteeism and academic performance of the students?
- Do all students scoring high marks take a nutritious diet?
- Is the mid-day meal scheme still efficient for the changing times? Are there any better alternatives?

Research Methodology

A qualitative research was conducted to understand the relationship among students’ nutrition with their academic performance and absenteeism. The study was located in a primary school in the North-west of Delhi. The data was collected from the field (specified school) in a sixteen week long internship programme. Forty three students from class V of the Municipal Corporation Department (MCD) School were observed and interviewed. The data from fifty one students of a private school was also collected. Information about the general patterns of students’ daily meal were gathered from 94 students (43 + 51). Students recorded about what they ate in a day for consecutive 5 days in a week. Later their eating patterns were observed, compared and analysed. Students’ attendance record for a month was collected from the attendance register (log) of the school. Their academic scores of the third unit tests (term test of November/ December, 2022) were taken as an indicator of their performance in the school. The data was also supplemented by the observational records of the researcher. A self-constructed questionnaire was used to collect information about their health and nutrition, which was followed up by a focused group discussion with children. An interview of in-service school teachers was also conducted to validate the findings of the research.

Data Collection

A typical profile of students studying in the MCD School:

The school located at Rohini, the North-West of Delhi was just behind a ‘basti’ having temporary houses with shared public washrooms, roofs were made from tin sheets and few houses did not even have doors. People living in the basti are migrant population from different states of India – Madhya

Pradesh, Uttar Pradesh and Jharkhand. Mostly adult males were engaged at construction sites working as labour on daily wages. There are days when people don’t even get work. Adult females either worked as house-help/ maids in the nearby society or stayed at home. For most of the students in the sample group, mid-day meal provided in school was the first meal of the day. These families are living in financial constraints and parents are working hard to meet the daily expenses of food, clothes and other essential items. Academic performance of students in school is not their priority. However, parents understand importance of education and link education of their children to better job opportunities for them. A very few students had support from their elder brother or sister for their studies. It was also observed that students with academic support at home performed better in assessment in the class.

A typical profile of students studying in the Private school:

The school is located in Central Delhi. Where majority of students belong from middle or high income group. Students live in ancestral flats. Mostly adult males in families are either employed in service sectors like government jobs or MNC's or engaged in small businesses. While mothers are either homemakers or working in office jobs either in government or private sector. All students come from an educated background where they aren’t themselves the first generation of learners. Moreover, students have joined coaching classes for further academic support. Students bring lunch to school and many of them carry money to buy fancy foods from the school canteen.

Table 1: Weekly Diet Chart of a students from a Public (Govt) and a Private school

MEALS	Government School (Public)	Private School
No of meals in a day	3	4
Food in between meals	No	Yes
DAY 1	Breakfast : None School break :1p biscuits, 1s khichidi, 1toffee Lunch: chapatti, 2s.band gobhi aloo ki sabzi Evening snacks: None Dinner :2 chapati, 2s dal, gur	Breakfast : 1 Egg sandwich, 1g banana shake School break :1p chips, 1 samosa , 1 Frootie Lunch: 1s dal, 1s rice, 1s Palak paneer sabzi Evening snacks: - None Dinner :2 chapati, 2s dal makhani , 1 b dahi
DAY 2	Breakfast : 2rusk ,1c tea School break :1s rice,1s dal, 1p chips Lunch:1s aloo palak sabzi,2 chapati Evening snacks: - Dinner : 2s rice,2s kadhi	Breakfast : -2 butter bun, 1b sweet dalia, 1c milk School break :1 s French fries, 1sachet tomato ketchup, 1p apple juice Lunch:1s matar aloo ki sabzi, 2 chapati, salad, 1b dahi Evening snacks: - Dinner :2s vegetable pulao, curd, salad
DAY 3	Breakfast : - School break :2s aloo sabzi,3poori Lunch: 1s dal, 1 chapati Evening snacks : -	Breakfast : -2 kachori aloo ki sabzi School break : 1s Pasta Lunch: 1s dal rice , sprouted moong dal Evening snacks: -

	Dinner : 1 chini ka paratha	Dinner : 3psc roasted chicken and 2 butter naan
DAY 4	Breakfast : - School break : 2s vegetable dalia, 1 chocolate Lunch: 2s methi aloo ki sabzi, 2 chapati Evening snacks : 1c tea, 2 slices of bread Dinner : Methi aloo paratha	Breakfast : 2 cheese sandwich, 1 cup milk School break : 1s Poha Lunch: 2s kadhi rice, 100g salad Evening snacks: - Dinner : 1s sarson ka saag, 2 makka ki roti
DAY 5	Breakfast : - School break : 2s khichdi 2b dal, 2 chapati Evening snacks : - Dinner : 1s aloo matar sabzi, 2 chapati	Breakfast : upma, 1 sandwich, 1 cup milk School break : 4 bread roll, 2tbs tomato ketchup Lunch: 2 s chole -rice , 100g salad Evening snacks: - Dinner : 2s soyabean chaap, 2 chapati
Nutrients present	Proteins, Fats, Carbohydrate, Vitamin, Mineral, Dietary fibre	Proteins, Fats, Carbohydrate Vitamin, Mineral, Dietary fibre
Nutrients absent	Sufficient iron and Calcium intake	Sufficient iron and Calcium intake

Data Analysis:

General Trends of Nutrition in Schools

The findings from the data collected from students in private schools showed that their calories in-take ranged from 2000-2500 kcal /day where as it ranged from 1500-2000 kcal /day for students in the government school. The estimated energy requirement of calorie intake in an average healthy diet for an India boy of 10-12 years is 2220 kcal /day while for an Indian girl of 10-12 years is 2060 kcal/day as calculated by ICMR, National institute of nutrition 2020.

These findings indicated a higher calorie intake among students of private school also reflecting on the future risks of developing obesity among students. While on the other hand students of government schools had a comparatively less intake of calorie in majority of students from the estimated energy requirement thereby leading to malnutrition and more prone to various deficiencies.

It was found that students in both the schools are not eating balanced diets. The iron and calcium deficiencies were found in many students of both the schools as recorded through the responses collected by circulation of the teacher's questionnaire however, the number of students with these deficiencies is relatively higher in the government schools. This observation is supported by the report of NFHS- 5 (National family health survey for India, 2019-2021, No 5), which documented that more Indians are becoming anaemic than before. 67% children under 5 are affected with anaemia. Such a high percentage of students with Anaemia is an alarming concern because children can get stunted growth, impaired cognitive development and increased morbidity from various infections and diseases.

Critical Analysis of Mid-day Meal Scheme

The pioneer of the mid-day meal scheme were UT of Pondicherry and states of Tamil Nadu, Gujrat, and Kerala with an objective to enhance students' enrolment, attendance and

retention along with improving the nutritional status of children. It was earlier recognized as "National Programme of Nutritional Support to Primary Education". Later in 2008-09 it was extended to upper primary classes followed by extension to bal vaatika in PM Poshan Yojna with rationale to promote social equality, school participation, healthy growth of children, gender equity and prevention of classroom hunger. The implementation of this scheme functions in collaboration of schools with CSO/NGO which together work to decide the menu and are responsible for required precautions, hygiene of the kitchens and the making along with the food distribution under consistent supervision for any untoward incident like food poisoning due to adulteration etc. The distribution of meal in two to four schools of an area comes under one NGO who also allocate a mid-day meal in-charge. Similarly schools appoint minimum two mid-day meal in-charges who are expected to taste the food along with the principal of the school before serving of food to the children. The mid-day meal menu for the school where study has been conducted is:

Monday	Chole chawal
Tuesday	Poori with Aaloo sabzi
Wednesday	Rajma chawal
Thursday	Vegetable daliya
Friday	Daal chawal
Saturday	Chole poori

A weekly menu is decided by the government NGO's that collaborate to provide meal to the school. Students' feedback are not taken into account for they are strictly planned according to the nutritional needs and requirements for the primary age group. In fact vegetable daliya, served in my school was highly disliked by the students, and often teachers commonly complained about food wastage on that particular day. The mid-day meal was generally served as per schedule. It is served hot and often late 5- 10 minutes than the scheduled time because the vehicle/transportation assistance carrying the food had to distribute meal to 3 more schools in the area. About 85% of students in the class, mid-day meal is the first meal of the day. They enthusiastically wait for the meal. It was observed that students studied or participated more energetically in the second half of the day, after having their meals.

Researches have shown that students who have had breakfast showed a positive effect on cognitive performance specially in keeping attention and remembering things longer and better (Wesnes et al., (2003, 2012); Widenhorn-Muller et al., (2008); Cooper et al., (2011); Pivik et al., (2012). Attention is a prerequisite for learning and memory (Baddeley et al., (1984); Craik et al., (1996); Muzzio et al., (2009). Additionally, the effect of breakfast on undernourished students was even more prominently positive Pollitt et al., (1996); Cueto et al., (1998). Students were found to have an increased attention after having breakfast as compared to not having it, thereby also impacting school performance and academic achievements in a cumulative manner. Greater engagement in class and active participation in learning activities are likely to create a more productive learning environment for learners.

During pandemic, in nationwide lockdown, when the schools were closed in order to fight malnutrition and feed the needy states like Kerala, Orissa came up with concepts like community kitchens where poverty stricken families were provided with nutritious meals twice a day at cheap prices

Sethuparvathy (2021). The schemes for providing students breakfast should definitely be implemented like Chief Minister's Breakfast Scheme launched by M. K. Stalin in year 2022 at Madurai, Tamil Nadu. It proposes to provide breakfast to primary school children from 1st to 5th in government schools for all working days. Basing upon the observation midday meal initiative has been playing a very important role in providing the necessities to the students like right to life, food and education. Paltasingh and Bhue (2022) have studied the efficacy of Mid-Day Meal Scheme in India and showed that a great increase in student enrolment in government schools with this initiative though any direct relationship among meal and improvement in students' academic achievements or performances has still not been established. Some propose the idea that food as an incentive to come to school can only assure student turn up, making them indifferent towards education however, students' presence is the first step towards progress.

Looking into absenteeism

In order to analyse absenteeism caused because of nutrition or health related issues among primary school students, the attendance was recorded of two months and excuses for absenteeism were listed. Two major reasons for students' absence were either they had gone to their hometowns/ villages (generally during harvest season) or some health related issues of their own or any family member. In order to understand the situation in detail, a case study on a student, who was frequently missing school was done.

Case Profile:

She is a 12 years old girl, studying in Vth Class. She weighs 18 kg and has a height of 110 cm. Her daily diet schedule is a packed biscuit/ chips in the morning at 8 am, followed by mid-day meal. In the span of two months, she had fever twice. She was also observed complaining about stomach aches frequently. She was absent from the school for 18 days in a span of 51 working days. Her attendance was extremely poor she was observed taking holidays frequently for her health. She is considerably shorter than the average height of the students of her age. Standard height of a 12 years old girl 59.4 in. (157 cm). She usually ate some packed foods like chips/ biscuits or toffees in the first period, which she buys on her own. She told that she gets 5/- from her mother every day, as her mother is working as a house help and leaves very early in the morning. Her class teacher is also concerned about her health. Only on few days she was observed taking interest in classroom activities otherwise, she seem to be distracted either because of any conflicts with the other students or unwell. Her weekly diet schedule showed that her calorie intake is much lower than the standard intake and her diets excludes nutritive food.

General trends of Achievement and Performance:

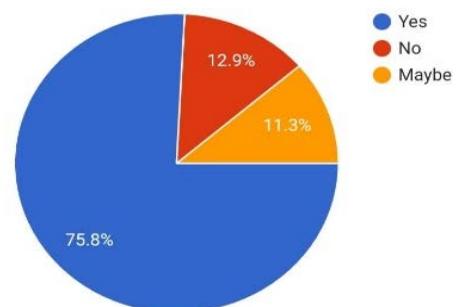
In order to assess students' academic achievements their scores out of 20 for the unit test were collected. The findings based on the classroom observations were added with the examination scores. The results showed that most of the students scoring 18-25 were having better nutrition intake in terms of calories as compared to others. The findings were similar to that of private school. However, there were exception as in both schools few students scored well in spite of not having a nutritional diet. It clearly indicated that nutrition was not the only factor affecting learning and performance of the students. The students' performance was also affected by opportunities and constraints like individual abilities, home guidance, resources, etc.

Teachers' Survey: In order to better understand the students and validate observations and findings, a survey of 62 teachers (27 from the government schools and 35 from the private schools) were conducted using a questionnaire – '**Examining the Relationship between Nutrition, Attendance and Academic Performance**'. It has following 7 questions:

1. Do you encounter students who come to school without having breakfast? (Yes/No/Maybe)
2. If yes then how often? (1/30, 5/30, 10/30, other)
3. What would you do if a student has not had his lunch nor has he done breakfast and keeps complaining about stomach ache?
4. Medical check-up in your school have an hour often?
(Doesn't happen, once an year, twice an year, thrice or more)
5. How often students diagnosed with deficiency?
6. How do you think malnutrition impacts academic performance of the students?
It has no effect/ it tends to make student stay distracted/ there attendance is affected/ it effects the learning negatively/ it affect students learning and attendance positively
7. Any related instance you want to share.

In response to question 1 i.e. Do you encounter students who come to school without having breakfast?

62 responses



75% of the teachers daily come across students who have not had breakfasts.

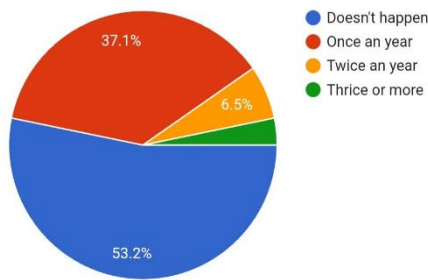
Q) What would you do if a student has not had his lunch nor has he done breakfast and keeps complaining about stomach ache?

For this question most of the teachers replied that they would foremost provide student with something to eat either by sharing their food or ask their fellow mates to share their food. In fact one of the teachers also shared that she keeps some biscuits with her for such students. Teachers also shared that they'd talk to student's parents to resolve the issue permanently either by writing a diary note or by calling them to know the reasons of student not getting their tiffin and making the parents aware on why student must have breakfast.

Medical check ups in your schools happen how often?



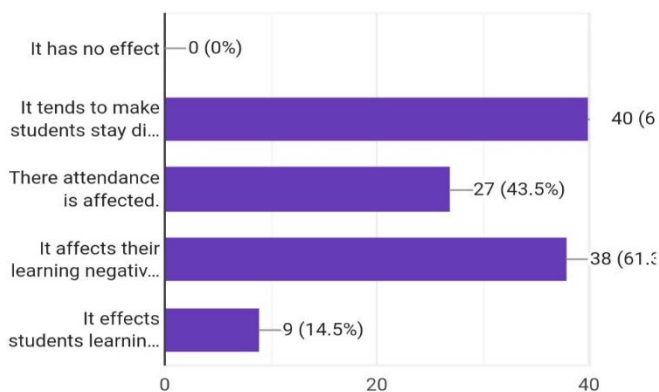
62 responses



Q) Medical check-ups in your schools happen how often?

Medical check-ups happen in schools when some free camp is organised. Sadly medical check-ups don't happen on a regular yearly basis in Delhi government schools and many private schools as well according to the data received from the teachers showed that 53.2 percent in service teachers voted that medical check-ups doesn't happen. However, as reported in many researches that medical screening of children in primary school aid early diagnosis and intervention to avert long term problems later.

62 responses



Q) How do you think Malnutrition impacts academic performance of students?

It was found that 64.5% of teachers felt that malnutrition tends to make students distracted and 43.5% felt that it affect attendance, 61.3% believed that it affects their learning negatively. 0% thought that malnutrition had no impact on either learning, attendance or distraction. While working on data collection and talking with the teachers on food and nutrition among students I observed that school teachers tend to ignore role of nutrition in students' performance. Classes have a lot of students' with learning difficulties, inattentiveness or drowsiness. Considering it as an important factor students should be provided with nutrition education for it helps them achieve healthy living and higher learning outcomes.

Results

On conducting research on what students eat, a general pattern was observed, that the issue of malnutrition and deficiencies did not just existed in only children studying in the

government schools (where majorly children from deprived families come from) rather these were observed even in students of private schools though the number was comparatively low. The diet of students in both types of school had fewer foods containing iron and calcium. There was a dissimilarity in the eating pattern was food intake of students. Student of private school had higher intake of food in terms of calories and nutrition in comparison to students of government schools possibly an impact of the availability of resources.

Psychologists believe that development in all aspects is interrelated across the domains. Students' growth is directly affected by their nutrition, which in turn is influenced by the socioeconomic status and nutritional awareness. Nutritional deficiencies impact the academic performances of children (Florence, Asbridge, and Veugelers, 2008) similar to the finding of this research. Most of the students who were performing academically better have comparatively healthy diet than others but answer to this question, "Are all High Scorers or high achievers taking a nutritious diet?" is definitely negatively. It thereby gives an insight that it's true that nutrition is having a great impact on students growth, immunity and health providing them with more opportunities to interact and explore their studies to their best academic achievement but is not the only factor impacting students' academic performance there by making exceptions. It was also observed that school teachers tend to ignore role of nutrition in students performances. Thus, it is recommended that students should be guided about nutrition education which, may help them achieve healthy living and attain higher learning outcomes.

Conclusion

According to the teachers' responses students tend to get distracted, or find it difficult to concentrate on studies when hungry thus, directly impacting their academic learning and achievements. Also, students who have some kind of deficiencies or are malnourished tend to fall sick more frequently thereby missing their school which indirectly results in hindering their academic learning and performance.

NEP 2020 raising the similar concern draws the strong interdependence of Education and Health. The healthy students are likely to have better academic or learning outcomes. It equally stresses on the right environment of the households proposing a shift of paradigm in Indian education system through proposing certain health related interventions like holistic education with sports-integration, expansion of food programme, introducing students to health education, healthy learning environments recognising the need for proper health and nourishment to aid optimal learning. This shift could be achieved by trying levelling the gaps between the making and the implementation of the policies.

References

- Alaimo, K., Olson, C. M., & Frongillo, E. A., Jr. (2001). "Food insufficiency and American children's cognitive, academic and psychosocial development." *Pediatrics*, 108(3), 824b.
- Arulampalam, W., R. Naylor, and J. Smith (2012): "Am I Missing Something? The Effects of Absence from Class on Student Performance," *Economics of Education Review*, 31(4), 363-375.
- Aucejo, E., & Romano, T. F. (2016). "Assessing the effect of school days and absences on test score performance." *Economics of Education Review*, 55, 70-87.
- Baddeley, A., Lewis, V., Eldridge, M., Thomson, N. (1984). "Attention and retrieval from long-term memory." *Journal of Experimental Psychology: General*, 113(4), 518-540.

- Balfanz, R., and V. Byrnes (2012): "Chronic Absenteeism: Summarizing What We Know from Nationally Available Data," Baltimore, MD: Johns Hopkins University Center for Social Organization of Schools Posted: May.(2013): "Meeting the Challenge of Combating Chronic Absenteeism: Impact of the NYC Mayor's Interagency Task Force on Chronic Absenteeism and School Attendance and its Implications for Other Cities," Baltimore, MD: Johns Hopkins School of Education. Posted: December.
- Belot, M., & James, J. (2009): "Healthy school meals and educational outcomes." *Journal of Health Economics*, 30(3), 489-504.
- Cooper, S. B., Bandelow, S., and Nevill, M. E. (2011). "Breakfast consumption and cognitive function in adolescent schoolchildren." *Physiol. Behav.* 103, 431-439. doi: 10.1016/j.physbeh.2011.03.018
- Craik, F. I. M., Govoni, R., Naveh-Benjamin, M., Anderson, N. D. (1996). "The effects of divided attention on encoding and retrieval processes in human memory." *Journal of Experimental Psychology: General*, 125(2), 159-180.
- Cueto S, Jacoby E, Pollitt E. (1998): "Breakfast prevents delays of attention and memory functions among nutritionally at-risk boys" *Journal of Applied Developmental Psychology*, Volume 19, issue 2 Page 219 -233
- Devadoss, S., and J. Foltz (1996): "Evaluation of Factors Influencing Student Class Attendance and Performance," *American Journal of Agricultural Economics*, 78, 499-507.
- Ebbeling C.B., Pawlak D.B, Ludwig D.S. (2002): "Childhood obesity: public health crisis, common sense cure." *Lancet*; 360: 473-482.
- Florence, M. D., Asbridge, M., & Veugelers, P. J. (2008): "Diet quality and academic performance." *Journal of School Health*, 78(4), 209-215.
- Gottfried M. A. (2010). "Evaluating the relationship between student attendance and achievement in urban elementary and middle schools: An instrumental variables approach." *American Educational Research Journal*, 47, 434-465.
- Gottfried M. A. (2011). "The Detrimental effects of missing school: Evidence from urban siblings." *American Journal of Education*, 117, 147-182.
- Gottfried, M. (2009): "Excused Versus Unexcused: How Student Absences in Elementary School Affect Academic Achievement," *Educational Evaluation and Policy Analysis*, 31, 392-415.
- Gottfried, M. A., & Kirksey, J. J. (2017). "When students miss school: The role of timing of absenteeism on students' test performance." *Educational Researcher*, 46(3), 119-130.
- Kim HY, Frongillo EA, Han SS, et al. (2003): "Academic performance of Korean children is associated with dietary behaviours and physical status." *Asia Pac J Clin Nutr.*;12 (2):186-192.
- Kleinman, R. E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano, M. E., & Murphy, J. M. (2002). "Diet, breakfast and academic performance in children." *Annals of Nutritional Metabolism*, 46 (Supplementary 1), 24-30. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3275817/>
- Martins, P., and I. Walker (2006): "Student Achievement and University Classes: Effects Of Attendance, Size, Peers, and Teachers," *IZA Discussion Paper* 2490, IZA.
- Meyers AF, Sampson AE, Weitzman M. (1991): "Nutrition and academic performance in school children". *Clin Appl Nutr.* 1:13-25
- Morrissey et al. 2013 "Family Income, School Attendance, and Academic Achievement in Elementary School" *Developmental Psychology* 50(3), 33848
- Muzzio, I. A., Kentros, C., Kandel, E. (2009). "What is remembered? Role of attention on the encoding and retrieval of hippocampal representations." *Journal of Physiology*, 587(Pt 12), 2837-2854.
- Paltasingh T., and Bhue P. (2022) : "Efficacy of Mid-Day Meal Scheme in India: Challenges and Policy Concerns" *Volume 68, Issue 4* <https://doi.org/10.1177/00195561221103613>
- Pivik, R., et al. (2012) Eating Breakfast Enhances the Efficiency of Neural Networks Engaged during Mental Arithmetic in School-Aged Children. *Physiology & Behavior*, 106, 548-555. <https://doi.org/10.1016/j.physbeh.2012.03.034>
- Pollitt E.(1996): "Timing and vulnerability in research on malnutrition and cognition." *Nutr Rev* ;54:S49-S55.
- Reid, K. (2005) "The Causes, Views and Traits of School Absenteeism and Truancy: An Analytical Review." *Research in Education*, 74, 59-82. <http://dx.doi.org/10.7227/RIE.74.6>
- Sethuparvathy, S. (2021): "Temporality and Spatiality of Food: How Community Kitchens Write Food Narratives Amidst Pandemics New literaria- An International Journal of Interdisciplinary Studies in Humanities Volume 2, No. 2, July- August, 2021, PP. 16-23 ISSN: 2582-7375
- Stanca, L. (2006): "The Effects of Attendance on Academic Performance: Panel Data Evidence for Introductory Microeconomics," *Journal of Economic Education*, 37, 251-266.
- Tattwamasi, P. and Prakash, B. (2022): "Efficacy of Mid-Day Meal Scheme in India: Challenges and Policy Concerns" *The Indian journal of public administration: quarterly journal of the Indian Institute of Public Administration* 68(12):001955612211036
- Veugelers PJ, Fitzgerald AL. (2005): "Dietary intake and risk factors for poor diet quality among children in Nova Scotia". *Can J Public Health.* 2005; 96: 212-216
- Wesnes et al. (2003): "Breakfast reduces declines in attention and memory over the morning in schoolchildren" *Appetite* Volume 41, Issue 3, Pages 329-331
- Widenhorn-Müller K, Hille K, Klenk J, Weiland U. (2008): "Influence of having breakfast on cognitive performance and mood in 13- to 20-year-old high school students: results of a crossover trial." *Pediatrics.* Aug;122(2):279-84. doi: 10.1542/peds.2007-0944. PMID: 18676544.
- Willett W. (1998): "Nutritional Epidemiology". 2nd Ed. New York, NY: Oxford University Press.