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Laconics on Empty Calories in Higher Institutions: Causes, and Effects on Students and Staff

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Abstract

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The paper discusses empty calories (ECs), which are calories from foods with little to no nutrients. ECs are found in processed foods with added fats, sugars, preservatives, and impurities. Consumption of ECs can lead to health issues like obesity, diabetes, heart disease, hypertension, and micronutrient deficiencies. Therein, the determinants of EC consumption are: Self-factors (food industry tactics, taste, palatability), environmental factors (advertising, availability in educational institutions), and poor knowledge about EC hazards contribute to consumption. Whereas, harms on students and staff include: EC consumption can lead to obesity, diabetes, heart issues, and micronutrient deficiencies, affecting health and potentially academic performance. Empty calories control measures include, provision of water, food oasis in educational institutions, and nutrition education can help curb EC consumption.

Keywords: Empty calories, staff, students, higher institutions, obesity, nutrients

1. Introduction

Nutrition is a basic and emphatic function of human body. There is no life or health without proper nutrition (Nnam, n.d.; Underwood & Galal, 2024). Das (2015) disclosed that empty calories or fast foods intake in children has been promoted through sports, working mothers, socioeconomic status, and nuclear families; therewith, the intake of empty calories causes hypertension, obesity, heart disease, diabetes, and dyslipidemia, therefore, marketing these products should be squarely regulated. Bhagyalakshmi et al. (2022) in a study among college youngsters in India, decried that, school cafeteria is selling empty calories such as chips, cold drinks, instead of the nutritious foods; in turn encouraging

students to engage in empty calories consumption, which will affect health.

Similarly, Lalnunthara & Kumar (2020) in a study of college youngsters consisting of 150 participants revealed that, youngsters buy and take empty calories without any rethinking about possible effects. This necessitates educational interventions to change the behavior of affected students (Lalnunthara & Kumar, 2020). Vaida (2015) found-out after a study of fast food intake in adolescents students, which was among the 80 respondents, flavor, availability, urbanization, and media, are among the major causes of fast food popularity. The objective of the paper is to discuss empty calories (ECs), their determinants and harms on students and staff of higher institutions.

2. Empty calories (ECs)

A calorie is a unit of food energy that is retrieved from different types of food materials, but the amount of calories in different foods may vary. The human body requires calories in order to get energy for carrying out body daily activities (Mayo Clinic News Network, 2018). Empty calories (EC) contain calories, but have little or no nutrients, and they are unable to supply good energy to the body (Zehra et al., 2018; Sonawane, 2024). Empty calories are mostly found in processed foods, calorie-dense, and non-nutrients dense. Empty calories are mostly containing added fats or added sugars or a mixture of both and alongside other chemicals. People consuming empty calories are left with hunger, therefore, demand for more (Martinez et al., 2010; Abera et al., 2017). Examples of empty calories containing stuffs include; soda, cake, bacon, donuts, cookies, candy, chocolate, muffins, refined cereals, noodles, macaroni, and spaghetti. It is important to limit or avoid empty calories in order to safeguard health, therefore, eating healthy foods or good calories such as fresh fruits, eggs, vegetables, milk, cereals, and lean meat, is paramount. Healthy foods contain required minerals, vitamins, antioxidants, and phytonutrients, and water (Imak, 2020; Ontario Medical Association, 2024). Worrisomely, nowadays, sugars or fats added to stuffs through vigorous industrial processes are everywhere. These stuffs or ECs are palatable and the industries are capitalizing on this behavior to sell their products, in fact the palatability of ECs causes addiction, especially in young people (Tilman & Clark, 2014; UNICEF, 2019; Tegmire et al., 2021; Sarkingobir, 2026).

Empty calories are calories that add insignificant or zero nutrients to food humans consumed. Empty calories contain either solid fats or added sugar or combination of both (Fulgoni, 2021; Maulana et al., 2024). Other components of empty calories include preservatives, and impurities. Solid fats are physically solid at room temperature, example, butter, shortening, beef fat; and they increase the risk of

cardiovascular diseases apart from obesity. Added sugar in empty calories includes syrups or artificial (or extracted) sugars prepared or processed and incorporated in foods (Lake, 2017; UNICEF, 2021). Examples of foods that students and teachers consume despite their categorization as empty calories include:

- Cakes
- Donuts
- Cookies
- Pastries
- Sodas
- Energy drinks
- Fruit drinks
- Sport drinks
- Cheese
- Pizza
- Ice cream
- Sausages
- Ribs
- Bacon
- Hot dogs
- Ketchup
- Yoghurt
- Crackers
- Breakfast cereals (Reedy et al., 2010; Roth, 2011; Shridhar et al., 2015; USDA, 2015; Meena et al., 2023; Whiteland, 2023).

3. Determinants of Empty calories among teachers and students

Self-factors

The food industries have well-broached awareness concerning human biology and sociology. Therefore, they ensure that empty calories are tasty, palatable, well-colored, well-textured, and well-varied to meet the demands of humans and stay for long in the shelf without deteriorating (Mohammed et al., 2024). This tactic goes a long way in inducing people to empty calories. Sugars and added fats are widely present in modern diets. Companies utilized the love of humans for taste to prepare empty calories that attract the public. The added sugars, fats, sodium, and other flavors incite the happiness neurotransmitters. The release of neurotransmitters encourages the body to demand for more pleasure. Other self-based factors encouraging empty calories in youth in school include time as corroborated by study survey (Rezaei, 2017). Other peculiarities of empty calories including ensuring fast use, convenience, low-cost, and accessibility are favorable to food companies. People with anxiety, poor self-efficacy, and stress issues are more prone to empty calories (Nawaz et al., 2020).

Poor knowledge about hazards of empty calories

Poor knowledge about hazards of empty calories is another factor that encourages humans to engage in unhealthy eating. Meena et al. (2023) examined knowledge of health hazards of junk foods in adolescents in India, and concluded that, adolescents investigated had inadequate awareness of health problems of empty calories. Likewise, Athubaiti (2022) demonstrated high intake of empty calories among population of female university students in Saudi Arabia, therein, the need for educating the students was stressed.

Environmental factors

Advertisement and promotion interventions that aid popularity of empty calories are well-practiced in our environments. There is wide range methods promoting empty calories, for instance, sports,

events, birthday and related ceremonies, gifts, are displaying the consumption of empty calories without recourse. Mass media platforms are readily marketing empty calories to all and sundry without boundary through ways such as magazine, Facebook, internet, televisions, radio, cinemas, billboards, etc (Dymytrenko, 2009; Das, 2015; Yang et al., 2020).

Educational institutions

Many of the educational institutions (EIs) are allowing restaurants to sell empty calories without hurdles, thus encouraging consumption, likewise, many schools are sandwiched with neighborhoods that are food deserts or food swamps (encouraging the consumption of unhealthy foods by selling them in stores, shops, markets, etc) (Das, 2015). Bhagyalakshmi et al. (2022) in an Indian study decried that empty calories are available and accessible in educational institutions premises (such as cafeteria) and surroundings areas. That is why Rezaei (2017) decried that consumption of empty calories is very high among population of students and youths in southwestern part of Iran.

Loss of family role

Because many of the families where students or teachers hail from are employed (working) they have no ample time to prepare food for the members, the mothers or girls or father could not afford to spend time preparing food for the family, unless occasionally because they are eager to go to work at school or are resuming late (or tired) from work, instead reclined on empty calories or fast foods to serve the family (Kaur, 2017; Lane et al., 2024).

Work-life balance

Because of tough office workload teachers or lecturers or administrators (either male or female) have no time to cook or prepare food at home or workplace, therefore rely on empty calories foods for meal (Khalid et al., 2020).

4. Theoretical determinants

Theories help us to comprehend public health issues or the requisite points for intervention (Raingruber, 2010). According to Socioecological

model (SEM), the habit of consuming ECs in students and staff of educational institutions could be broached as shown in Table 1.

Table 1: Application of Socioecological model (SEM) in the habit of consuming ECs in students and staff of educational institutions

S/N	Factors/ determinants	Examples and explanations
1	Intrapersonal factors (IF)	IF include individual characteristics of staff or students such as knowledge, self-concept, belief. These factors are mended through awareness creation using formal educational learning tools or otherwise. In this vein, Vidya et al. (2015) in a survey of schooling children (200 of them) at Bangalore, show consumption of junk foods as favorite thing including, snacks, fast foods, candies, due to taste, color, marketing, and parenting, stressing the role of parents in nutrition and inculcation of physical activities to children. In Iraq, Abdulrahman et al. (2022), recruited 233 respondents in a study determining awareness and food consumption habits of university community in Suleimanyah. The results show, moderate knowledge of food safety, staff and students are abreast about the hazards of contaminated foods, but their level of education do not prevent them from the risk of fast foods consumption. Vaida (2013) in an Indian study using interview among 80 students indicated that, gender and economic levels are linked to empty calories consumption.
2	Interpersonal factors	These include processes and groups such as friends, families, and peers, that are the primary contact of the person involved (staff or student). Ensuring that these factors support healthy eating is advantageous.
3	Institutional factors	These factors include the churches, mosques, workplaces, schools, and their norms. Institutions that prohibit ECs, and encourage food oasis and school meals, are advantageous.
4	Community factors	Community factors are the relationships between different organizations or institutions. The method used by companies to affect colors, texture, brand and availability, are among the determinants of empty calories as found by Vaida (2013).
5	Public policies	Refers to what the government decided to do or avoid, and the norms that affect public nutrition.

Source; Raingruber (2010); Marzban & Mesoonmi (2024)

5. Potential effects of empty calories consumption

Obesity

Empty calories consumption on regular or chronic or acute basis is linked to obesity, while obesity is

a risk factor of diabetes, heart attack, cardiovascular diseases, and similar chronic problems. The obesity elicited by empty calories is linked to the tendency of these stuffs to stimulate accumulating unused and excess cholesterol, and sugar in the

human biological system (Iwajomo et al., 2021; Nayak, 2020; UNICEF, 2021; Jia et al., 2022; Porwal, 2022; Meena et al., 2023).

Diabetes

Excess intake of sugar embedded in empty calories cause type 2 diabetes, which is a very dangerous metabolic disorder affecting humans nowadays (Kaur, 2017; Hamish & Angush, 2019; Khalid et al., 2020; Lane et al., 2024).

Heart disease, stroke, and high blood pressure

Richness of ECs in sodium is a causative agent that spurs heart disease or hypertension (high blood pressure) (Arya & Mishra, 2013; UNICEF, 2019; Jia et al., 2022).

Micronutrients deficiency

The concentration of micronutrients (vitamins and minerals) needed by the body to function well is very low or insignificant in ECs, because they are not embedded components therein. Therefore, people who relied on these stuffs as their diet are of great risk of developing deficiency of one nutrient or many. People suffering micronutrient deficiency may have poor educational achievement (Islam, 2020; Goh et al., 2024; Juri et al., 2024).

6. Some nutrients needed by the staff and students

The human body obtains major compounds from foods in order to live. These compounds are

Table 2: Some vitamins and their various functions for the human body

S/N	Vitamin	Function to the body	Symptoms of insufficiency	Dietary sources
1	Vitamin A	Required for proper function of the skin, vision, normal growth, and mucous membrane	Flaky skin, night blindness, xerophthalmia	Fish-liver oil, yellow vegetables, green vegetables, fruits, egg yolk, milk, palm oil
2	Vitamin D or calciferol	Increases absorption of calcium and phosphorus element in the intestine, responsible in hardening	Rickets occur in children (poor bone, poor teeth making), soft bones occur in adults	Fish-liver oil, egg yolk

naturally made by nature, therefore different from the empty calories made through ultra-processing using industrial actions. The healthy nutrients or compounds needed in foods include carbohydrates, proteins, fats, and micronutrients (consisting of vitamins and minerals). The carbohydrates, fats, and proteins major functions include the provision of energy for biochemical activities and rebranding of carbon skeletons for structure and other purposes. Carbohydrates are natural nutrients contain carbon, hydrogen, and oxygen, therewith; hydrogen and oxygen are in ration of 2:1. Proteins are consisting of polypeptide chains essential in various functions in the body, for instance, hormones (signally in the body), hemoglobin (oxygen transport across body’s cells), collagen (a connective tissue component), and enzymes (that speed-up rate of chemical reactions in the body). Fats are major fuels for humans serving as energy stores and components of cellular membranes (Cherian et al., 2021; Fulgoni, 2021).

Vitamins are organic substances acting as biocatalyst to promote reactions in the biological system (Mateljan, 2010; Clifford & Kozil, 2017). Some vitamins and their various functions for the human body are listed in Table 2.

		of and calcification of bone		
3	Vitamin E or tocopherol	Insulates fatty acids and cell membranes against oxidative stress		Leafy vegetables are good sources, liver, intestinal bacteria
4	Vitamin K	Help in the synthesis of blood clotting factors	Slow clotting of blood in turn leading to severe bleeding during cut	Vegetables, liver
5	Vitamin B1 (thiamine)	Required by the body for synthesis of coenzymes needed in respiration	Beri-beri (leading to wasting of muscles, and paralysis); stunted growth	Rice bran, liver, groundnut, beans
6	B2 (Riboflavin)	Required in the formation of coenzymes needed in respiration	Cracking of skin in the corners of eyes, mouth, and nose	Liver, eggs, leafy vegetables, kidney
7	B3 (niacin or nicotinic acid)	Formation of certain coenzymes required by cellular respiration	Pellagra (occur as scaly pigmented skin, presence of sore in tongue, mouth, and nervous distress)	Milk, liver, whole grains, eggs
8	B5 (pantothenic acid)	Required in the formation of certain coenzymes required by cellular respiration	Nervous system and gut disorders	Rice bran, liver, eggs
9	B6 (pyridoxine)	Needed for synthesis of amino acids	Diarrhea, anemia	Cereals, eggs
10	B12 (cyanocobalamin)	Formation of red cells	Pernicious anemia	Cereals, kidney, eggs, fish, liver
11	Folic acid	Essential in the formation of red cells	Anemia	Fish, , liver, leafy vegetables, milk
12	Vitamin C (ascorbic acid)	Required in the formation of healthy bones, connective tissue,	Scurvy (occur as swelling in gums and joints, loosening of teeth,	Citrus fruits, guava, pawpaw, leafy green vegetables,

	dentine, and protection against infection	and hemorrhage of the skin and membranes
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Source: Michigan WIC Program (2022)

Minerals

Minerals are micronutrients required by the body in minute amount for regulation of metabolic activities, and serving as structural components of the

body (Bo et al., 2020; Barth et al., 2021). Some mineral elements and their functions to human body are shown in Table 3.

Table 3: Some mineral elements and their functions to human body

S/N	Mineral	Function	Symptoms of insufficiency	Healthy dietary sources
1	Sodium	Vital part of blood plasma, useful in maintaining correct osmotic pressure in body fluids, required for transmission of impulses in nerves, sensory cells, and muscles. It is required for normal permeability of cell membrane	Muscle cramp, dehydration, kidney failure characterized by excess edema and hypertension	Salt, meat, milk, eggs, and other natural foods
2	Chlorine	Maintains right osmotic pressure	Muscle cramps (excess edema)	Salt, and natural foods
3	Potassium	Vital part of blood plasma, useful in maintaining correct osmotic pressure in body fluids, required for transmission of impulses in nerves, sensory cells, and muscles. It is required for normal permeability of cell membrane	Muscle paralysis	All types of natural foods
4	Calcium	Major vital part of bones, teeth, required in blood clotting, proper functioning of heart, muscle, and nerves	Soft bones, rickets in children	Green vegetables, eggs, milk
5	Phosphorus	Phosphorus is required in the transfer of energy, many chemical reactions, part of DNA and RNA, major part of bones and teeth	Rickets	Milk, eggs, fish
6	Magnesium	Major vital part of bones, activates glycolytic enzyme	Depression, weakness, muscle contraction impairment	Nuts, leafy vegetables, sea foods
7	Iron	Major vital part of hemoglobin, and myoglobin	Anemia	Meat, eggs, green vegetables
8	Cobalt	Hemoglobin formation	Pernicious anemia	Meats
9	Fluorine	Hardening of bones, and teeth	Dental caries	Traces are in milk

10	Iodine	Synthesis of thyroid hormones, normal growth and reproduction	Poor growth, goiter, poor academic performance	Salt, sea foods
11	Copper	Important in Hemoglobin formation		Meat, liver
12	Manganese	Hemoglobin formation, and certain enzyme activity		

Source: Awuchi et al. (2020); Michigan WIC Program (2022); Aki (2024)

7. Possible control measures

There are combination of tips that are supposed to be embraced to curb ECS among students and staff of higher educational institutions. Some of the methods are broached under this section:

Provision of water

Water should be safe and available at educational institutions at all times, so that hygiene and food preparations are facilitated. Administrators, non-governmental organizations (NGOS), donors, community, and wealthy people are to shoulder provision of safe and available water to students and staff (Abubakar et al., 2016; Sarkingobir, 2025a).

Provision of food oasis at educational institutions (EIs)

Provision of food oasis at educational institutions (EIs) premises and the nearby areas is an important tip to be inculcated by government and related stakeholders. There should be stores, food canteens, markets (formal and non-formal) that are responsible for selling healthy foods including fruits, vegetables, cereals, and others. Equally, educational institutions (EIs) should have institutional-based provided meals for students and staff, irrespective of the tier of the institution (Sarkingobir, 2025b).

Nutrition education is a key aspect of curbing ECs EIs should connive with parents to ensure that students and staff have basic nutritional awareness, the updated dos and don'ts of nutrition, awareness concerning healthy food preparation, and inculcate life skills on the ways to deal with stress, anxiety, work-life balance (or study-life balance), and gender role, and family role as regards to nutrition (Jones et al., 2015; Cena & Calder, 2020; Berkley, 2023; Bakhtiar et al., 2024). Parents should be

educated on the need to provide healthy food to wards (either in cooked, prepared or raw form), and wives should learn and endure how to cook. Likewise, the male staff supposed to have and implement capacity to cook and prepare healthy foods. The methods of awareness and behavior change should be formal or informal (WHO, 2006; Aiman et al., 2018).

Urban agriculture

The practices of urban agriculture by utilizing every space and opportunity (that may be different from the traditional pace-requiring farming) to farm healthy foods in cities, roads, schools, offices, markets, and any other public space. Institutions should utilize gardens, farms, and relations to enhance access to healthy foods for staff and students (Areola et al., 2006; Aberra et al., 2017; Baa-Poku et al., 2020; Dahlin & Svensson, 2021; Borges & Mathiesen, 2024).

8. Conclusion

Nowadays, many higher institutions are embroiled with environment such as restaurants that sell empty calories more than the healthy foods (natural products such as vegetables, fruits, legumes, etc), many students and lecturers are unaware about how to shun empty calories, and the busy nature of higher institutions are among the factors that encourage empty calories at higher institution. Certainly, higher institutions are critical parts of the human environment. They have the ability to shape the lives of young people either positively or otherwise. They can educate them and the public on healthy eating strategies and provide an environment that support healthy eating, instead of allowing the public to rely on unhealthy empty calories.

Indeed, empty calories - which are calories from foods and drinks with little to no nutritional value like added sugars, unhealthy fats, and alcohol - can lead to health issues if consumed excessively. These issues include weight gain, nutrient deficiencies, increased risk of chronic diseases like heart disease, type 2 diabetes, and metabolic syndrome. The Dietary Guidelines for Americans recommends that about 85% of daily calories come from nutrient-dense foods, leaving about 15% for "discretionary" or empty calories. Limiting empty calories is a key method to maintaining a healthy diet. Swapping empty-calorie foods for nutrient-dense options like fruits, vegetables, whole grains, lean proteins, and healthy fats can support long-term health and weight management.

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