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Effect of Nutrition on the Mental Development of Children

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ABSTRACT

Nutrition plays a crucial role in the mental development of children, impacting cognitive function, emotional regulation, and overall brain health. This paper reviews the current literature on the relationship between nutrition and mental development, emphasizing the importance of adequate intake of essential nutrients during critical periods of brain growth. Key nutrients such as omega-3 fatty acids, iron, zinc, and vitamins A, B, C, and D are highlighted for their specific contributions to neurological development and cognitive performance. The paper also discusses the adverse effects of malnutrition, including stunted growth, reduced IQ, and increased susceptibility to mental health disorders. Interventions that improve nutritional status, such as supplementation programs, dietary diversification, and fortified foods, are explored for their effectiveness in enhancing cognitive outcomes. The findings underscore the need for integrated nutrition policies and programs targeting pregnant women and young children to ensure optimal mental development and long-term health benefits.

Keywords: Nutrition, Mental development, Cognitive function, Brain health, Child development

INTRODUCTION

Nutrition plays a fundamental role in the overall health and development of children, encompassing not only physical growth but also cognitive function and mental well-being. Adequate nutrition during early childhood is particularly critical, as this period represents a period of rapid brain development and neural plasticity [1, 2]. During the early years of life, the brain undergoes significant structural and functional changes, laying the foundation for cognitive abilities such as attention, memory, language, and executive function [3, 4]. These developmental processes are highly influenced by environmental factors, including nutrition, which provide the essential building blocks for brain growth and neural connectivity [5]. The mental development of school-aged children is influenced by various factors, with nutrition playing a crucial role in shaping cognitive function, academic performance, and socio-emotional well-being. However, inadequate nutrition, characterized by deficiencies in essential nutrients or poor dietary quality, can hinder optimal brain development and compromise children's overall mental health outcomes. Understanding the effect of nutrition on mental development among school-aged children is essential for informing targeted interventions and promoting optimal cognitive and emotional well-being in this population [6-9]. This paper aims to examine the impact of nutrition on cognitive function and academic performance among school-aged children. While assessing the association between specific nutrients, dietary patterns, and mental health outcomes in school-aged children, it will also identify the factors influencing nutritional status and dietary intake among school-aged children and their implications for mental development. Lastly, the paper will explore interventions and strategies aimed at improving nutrition and promoting mental development among school-aged children.

Conceptual Review

Nutrition

Nutrition encompasses the processes by which living organisms obtain and utilize nutrients for growth, development, and maintenance of health. It involves the intake, digestion, absorption, transport, utilization, and excretion of nutrients from food sources to support cellular functions, metabolic processes, and overall well-being [10]. Nutrition is a multidimensional concept that encompasses both the qualitative and quantitative aspects of dietary intake, as well as the interaction between nutrients and other environmental factors. At its core, nutrition aims to optimize the balance of essential nutrients, including carbohydrates, proteins, fats, vitamins, minerals, and water, to meet the physiological requirements of the body and sustain optimal health outcomes across the lifespan [11]. It involves making informed dietary choices, adopting healthy eating patterns, and promoting nutritional literacy to prevent malnutrition, deficiency diseases, and diet-related chronic conditions.

Mental Development

Mental development refers to the gradual and sequential progression of cognitive, emotional, social, and behavioral abilities that occur throughout the lifespan, from infancy through adulthood [12]. It encompasses the acquisition of knowledge, skills, and competencies necessary for adaptive functioning and successful navigation of the physical, social, and cultural environments. Mental development involves complex interactions between genetic predispositions, environmental influences, and individual experiences, shaping the architecture and functioning of the brain [13]. At its core, mental development encompasses various domains, including:

Cognitive Development

The process of acquiring and refining cognitive abilities such as perception, attention, memory, language, problem-solving, and reasoning skills. Cognitive development involves the maturation of neural networks and cognitive processes, influenced by genetic factors and environmental stimuli [14].

Emotional Development

The progression of emotional awareness, regulation, expression, and understanding of self and others. Emotional development involves the cultivation of empathy, resilience, emotional intelligence, and coping strategies to manage and adapt to changing emotional states and social interactions [15].

Social Development

The development of interpersonal skills, social interactions, relationships, and societal roles within the context of family, peers, community, and culture. Social development encompasses the ability to form attachments, cooperate, communicate effectively, and navigate social norms and expectations [16].

Behavioral Development

The establishment of behavioral patterns, habits, and responses to internal and external stimuli. Behavioral development involves the integration of biological, psychological, and environmental factors in shaping behavior, motivation, self-regulation, and decision-making processes [17]. Mental development is a dynamic and ongoing process influenced by a myriad of factors, including genetic predispositions, prenatal and early childhood experiences, family dynamics, socio-economic status, education, culture, and societal influences. It reflects the continuous interaction between nature and nurture, wherein genetic potentials interact with environmental stimuli and experiences to shape individual differences in cognitive, emotional, and social functioning [18, 19].

Children

Children refer to individuals in the early stages of human development, typically ranging from infancy to adolescence, although the specific age range may vary across cultures, legal systems, and contexts. The concept of childhood encompasses a period of rapid physical, cognitive, emotional, and social growth, characterized by significant milestones and transitions toward greater independence and autonomy [20]. Childhood is a period of vulnerability and opportunity, during which experiences and environments profoundly shape long-term outcomes and well-being. Children require nurturing, supportive environments, positive relationships, and opportunities for play, exploration, and learning to thrive and reach their full potential [21].

Dietary Patterns and Academic Performance among School-Aged Children

Dietary patterns play a significant role in shaping academic performance and cognitive function in school-aged children. Numerous studies have demonstrated that healthy dietary patterns characterized by high intake of fruits, vegetables, whole grains, lean proteins, and healthy fats are associated with better academic performance and cognitive outcomes in school-aged children [22]. These dietary patterns provide essential nutrients, including vitamins, minerals, antioxidants, and omega-3 fatty acids, which support brain health, neurotransmitter function, and cognitive development [23]. Additionally, micronutrients such as iron, zinc, vitamin B12, and folate play crucial roles in neuronal signaling, neurotransmitter synthesis, and myelination, influencing cognitive function and academic achievement [24]. Deficiencies in these micronutrients have been linked to cognitive deficits, attention problems, and learning difficulties in school-aged children, underscoring the importance of adequate nutrient intake for optimal brain health [25]. Conversely, diets high in processed foods, sugar, unhealthy fats, and sugary beverages have been associated with poorer academic achievement, attention deficits, and behavioral problems in school-aged children [26]. These dietary patterns are often low in essential nutrients and high in energy-dense, nutrient-poor foods, leading to nutritional imbalances, inflammation, and oxidative stress, which can impair cognitive function and academic performance [27].

Interventions Promoting Healthy Eating and Academic Success

School-based interventions aimed at promoting healthy eating habits and improving dietary intake have been shown to enhance academic performance and cognitive outcomes in children [14]. Nutrition education programs, school meal initiatives, and policies promoting access to nutritious foods in schools have been effective in encouraging healthy dietary behaviors and supporting academic success [28]. Family dietary patterns and home food environments significantly influence children's dietary habits and academic performance [29]. Parental modeling of healthy eating behaviors, provision of nutritious meals, and involvement in meal preparation and planning are

important factors contributing to children's dietary patterns and academic success [30]. Nevertheless, community-wide initiatives and policies promoting access to healthy foods, nutrition education, and physical activity can create supportive environments that facilitate healthy dietary patterns and academic achievement in children [31]. Equally, collaborative efforts involving schools, families, healthcare providers, and policymakers are essential for implementing comprehensive interventions that address the multifaceted determinants of dietary patterns and academic performance in school-aged children [32]. Thus, understanding the complex interplay between dietary patterns and academic performance in school-aged children is crucial for developing effective interventions and policies aimed at promoting optimal health and educational outcomes in this population.

Factors Influencing Nutritional Status among School-Aged Children in Nigeria

Nutritional status among school-aged children in Nigeria is influenced by a multitude of factors spanning socio-economic, environmental, cultural, and individual determinants. Understanding these factors is crucial for designing effective interventions to improve nutritional outcomes and overall health in this population. Some of the factors include; Socioeconomic status, including household income, parental education level, and access to basic amenities, significantly influences nutritional status among school-aged children in Nigeria [33]. Children from low-income households are at higher risk of malnutrition due to limited access to nutritious foods, inadequate healthcare services, and poor sanitation conditions [34]. Secondly, Parents' education level and awareness of proper nutrition practices also play a crucial role in shaping dietary habits and nutritional outcomes in children [35]. Food insecurity, resulting from poverty, economic instability, and food price fluctuations, equally contributes to inadequate dietary intake and poor nutritional status among school-aged children in Nigeria [36]. Families facing food insecurity often rely on low-cost, energy-dense foods with poor nutritional value, leading to micronutrient deficiencies and stunted growth in children [37]. Dietary practices, including meal frequency, dietary diversity, and consumption of nutrient-rich foods, influence nutritional status among school-aged children in Nigeria [38]. Traditional dietary patterns, cultural beliefs, and food preferences shape food choices and dietary habits in different regions of Nigeria, impacting nutritional adequacy and health outcomes [39]. In the same vein, access to healthcare services, including routine check-ups, immunizations, and growth monitoring, is essential for early detection and management of malnutrition among school-aged children [40]. Limited access to healthcare facilities, inadequate staffing, and poor health infrastructure in rural areas pose barriers to timely healthcare interventions and nutritional support for children [41]. Following closely is poor hygienic conditions. Poor water quality, inadequate sanitation facilities, and lack of hygiene education contribute to the burden of waterborne diseases and malnutrition among school-aged children in Nigeria [42]. Improving access to clean water sources, promoting hygienic practices, and investing in sanitation infrastructure are essential for reducing the prevalence of malnutrition and improving health outcomes in children [43]. Again, Community-level factors, such as social norms, cultural practices, and community support systems, influence nutritional status and health-seeking behaviors among school-aged children in Nigeria [44]. Engaging community leaders, religious institutions, and local stakeholders in nutrition education and advocacy efforts can promote positive dietary behaviors and improve nutritional outcomes in children [45]. Understanding the complex interplay between these factors is essential for developing comprehensive interventions and policies aimed at addressing malnutrition and improving nutritional status among school-aged children in Nigeria.

Impact of Nutrition on Cognitive Function in School-Aged Children

Nutrition plays a crucial role in supporting cognitive function and academic performance in school-aged children. Thus, adequate nutrition is essential for optimal brain development and cognitive function in school-aged children [23]. Nutrients such as omega-3 fatty acids, iron, zinc, vitamins B6, B12, and folate are critical for neuronal development, neurotransmitter synthesis, and synaptic plasticity, which influence learning, memory, and attention [24]. Omega-3 fatty acids, particularly docosahexaenoic acid (DHA), are essential for brain structure and function, with studies suggesting a positive association between DHA intake and cognitive performance in children [46]. Fish consumption, a rich source of omega-3 fatty acids, has been linked to better academic achievement and cognitive outcomes in school-aged children [47]. In the same vein, Iron deficiency, common among school-aged children, can impair cognitive function, attention, and academic performance [48]. Iron supplementation or dietary interventions aimed at improving iron intake have been shown to enhance cognitive abilities and school performance in iron-deficient children [49]. Micronutrients such as zinc, vitamin B12, and folate play important roles in neurotransmitter synthesis, myelination, and neuronal signaling, influencing cognitive development and academic achievement [50]. Deficiencies in these micronutrients have been associated with cognitive deficits and learning difficulties in school-aged children [25].

Dietary Patterns and Academic Performance

Healthy dietary patterns characterized by high intake of fruits, vegetables, whole grains, and lean proteins are associated with better academic performance and cognitive outcomes in school-aged children [22]. Conversely, diets high in processed foods, sugar, and unhealthy fats have been linked to poorer academic achievement, attention deficits, and behavioral problems [4].

CONCLUSION/RECOMMENDATION

Understanding the impact of nutrition on cognitive function in school-aged children is crucial for developing effective interventions and policies aimed at promoting optimal brain health and academic achievement in this population. Accordingly, school meal programs providing nutritious meals to students have been shown to enhance cognitive performance, attendance, and behavior in school-aged children from disadvantaged backgrounds. Nutrition education programs implemented in schools can therefore improve children's knowledge of healthy eating habits and promote positive dietary behaviors that support cognitive function.

REFERENCES

1. Anyanwu, C., Ibelegbu, C., Ugwu, C., Okonkwo, V., & Mgbemene, C. (2021). Comparative evaluation of mesh sieve performance of a wet cereal slurry sieving machine. *Agricultural Engineering International: CIGR Journal*, *23*(1), 115-127.
2. Rosales FJ, Reznick JS, Zeisel SH. Understanding the role of nutrition in the brain and behavioral development of toddlers and preschool children: identifying and addressing methodological barriers. Nutr Neurosci. 2009 Oct;12(5):190-202. doi: 10.1179/147683009X423454. PMID: 19761650; PMCID: PMC2776771.
3. Prado EL, Dewey KG. (2014). Nutrition and brain development in early life. Nutrition Reviews, 72(4), 267-284.
4. Nyaradi, Anett & Li, Jianghong & Hickling, Siobhan & Foster, Jonathan & Oddy, Wendy. (2013). The Role of Nutrition in Children's Neurocognitive Development, From Pregnancy Through Childhood. Frontiers in human neuroscience. 7. 97. 10.3389/fnhum.2013.00097.
5. McCann JC, Ames BN. (2005). Is docosahexaenoic acid, an n-3 long-chain polyunsaturated fatty acid, required for development of normal brain function? An overview of evidence from cognitive and behavioral tests in humans and animals. The American Journal of Clinical Nutrition, 82(2), 281-295.
6. Saavedra JM, Prentice AM. Nutrition in school-age children: a rationale for revisiting priorities. Nutr Rev. 2023 Jun 9;81(7):823-843. doi: 10.1093/nutrit/nuac089. PMID: 36346900; PMCID: PMC10251301.
7. Roberts M, Tolar-Peterson T, Reynolds A, Wall C, Reeder N, Rico Mendez G. The Effects of Nutritional Interventions on the Cognitive Development of Preschool-Age Children: A Systematic Review. Nutrients. 2022 Jan 26;14(3):532. doi: 10.3390/nu14030532. PMID: 35276891; PMCID: PMC8839299.
8. Ugwu, C. N., & Okon, M. B. Fostering Food Security through Enhanced Fertilizer Production: Examining Policy Frameworks. INOSR Experimental Sciences 13(1) 31 – 37
9. Nneoma, U. C. Understanding the Risk Landscape: Analyzing Factors Impacting Food Vending in Nigeria. INOSR Experimental Sciences 13(1) 72 – 79.
10. Chen Y, Michalak M, Agellon LB. Importance of Nutrients and Nutrient Metabolism on Human Health. Yale J Biol Med. 2018 Jun 28;91(2):95-103. PMID: 29955217; PMCID: PMC6020734.
11. Townsend, Jeremy R., Trevor O. Kirby, Tess M. Marshall, David D. Church, Adam R. Jajtner, and Ralph Esposito. 2023. "Foundational Nutrition: Implications for Human Health" *Nutrients* 15, no. 13: 2837. https://doi.org/10.3390/nu15132837
12. Shonkoff JP. Capitalizing on Advances in Science to Reduce the Health Consequences of Early Childhood Adversity. JAMA Pediatr. 2016 Oct 01;170(10):1003-1007. [PubMed]
13. Halfon N, Hochstein M. Life course health development: an integrated framework for developing health, policy, and research. Milbank Q. 2002;80(3):433-79, iii. doi: 10.1111/1468-0009.00019. PMID: 12233246; PMCID: PMC2690118.
14. Pettigrew S, Pescud M, Donovan RJ. (2017). Factors influencing the implementation of nutrition policies in schools: A scoping review. Health Promotion International, 32(5), 901-911.
15. Erikson, E. H. (1950). *Childhood and society*. W W Norton & Co.
16. Vygotsky LS. (1978). Mind in Society: The Development of Higher Psychological Processes. Cambridge, MA: Harvard University Press.
17. Bandura A. (1986). Social Foundations of Thought and Action: A Social Cognitive Theory. Englewood Cliffs, NJ: Prentice Hall.
18. Stoewen DL. Nature, nurture, and mental health Part 1: The influence of genetics, psychology, and biology. Can Vet J. 2022 Apr;63(4):427-430. PMID: 35368400; PMCID: PMC8922370.
19. Carpendale, Jeremy & Lewis, C.. (2004). Constructing an Understanding of Mind: the Development of Children's Social Understanding within Social Interaction. The Behavioral and brain sciences. 27. 79-96; discussion 96. 10.1017/S0140525X04000032.
20. van den Berk-Clark C, Secrest S, Walls J, Hallberg E, Lustman PJ, Schneider FD, Scherrer JF. Association between posttraumatic stress disorder and lack of exercise, poor diet, obesity, and co-occuring smoking: A systematic review and meta-analysis. Health Psychol. 2018 May;37(5):407-416. doi: 10.1037/hea0000593. PMID: 29698016; PMCID: PMC5922789.

21. Kirby, James N. 2020. "Nurturing Family Environments for Children: Compassion-Focused Parenting as a Form of Parenting Intervention" *Education Sciences* 10, no. 1: 3. https://doi.org/10.3390/educsci10010003
22. Burrows TL, Whatnall MC, Patterson AJ, Hutchesson MJ. (2017). Associations between dietary intake and academic achievement in college students: A systematic review. Healthcare, 5(4), 60.
23. Benton D. (2010). The influence of dietary status on the cognitive performance of children. Molecular Nutrition & Food Research, 54(4), 457-470.
24. Bryan J, Osendarp S, Hughes D, et al. (2004). Nutrients for cognitive development in school-aged children. Nutrition Reviews, 62(8), 295-306.
25. Eilander A, Muthayya S, van der Knaap H, Srinivasan K, Thomas T, Kok FJ, Kurpad AV, Osendarp SJ. Undernutrition, fatty acid and micronutrient status in relation to cognitive performance in Indian school children: a cross-sectional study. Br J Nutr. 2010 Apr;103(7):1056-64. doi: 10.1017/S000711450999273X. Epub 2009 Dec 14. PMID: 20003612.
26. Nyaradi A, Li J, Hickling S, Foster JK, Jacques A, O'Sullivan TA. (2013). The role of nutrition in children's neurocognitive development, from pregnancy through childhood. Frontiers in Human Neuroscience, 7, 97.
27. Francis H, Stevenson R. Validity and test-retest reliability of a short dietary questionnaire to assess intake of saturated fat and free sugars: a preliminary study. J Hum Nutr Diet. 2013 Jun;26(3):234-42. doi: 10.1111/jhn.12008. Epub 2012 Nov 29. PMID: 23190372.
28. Chaparro JM, Badri DV, Vivanco JM. Rhizosphere microbiome assemblage is affected by plant development. ISME J. 2014 Apr;8(4):790-803. doi: 10.1038/ismej.2013.196. Epub 2013 Nov 7. PMID: 24196324; PMCID: PMC3960538.
29. Jackson JA, Smit E, Manore MM, John D, Gunter K. The Family-Home Nutrition Environment and Dietary Intake in Rural Children. Nutrients. 2015 Nov 25;7(12):9707-20. doi: 10.3390/nu7125495. PMID: 26610566; PMCID: PMC4690047.
30. Patrick, H. and Nicklas, T.A. (2005) A review of family and social determinants of children's eating patterns and diet quality. Journal of American College of Nutrition, 24, 83-92.
31. Story M, Nanney MS, Schwartz MB. Schools and obesity prevention: creating school environments and policies to promote healthy eating and physical activity. Milbank Q. 2009 Mar;87(1):71-100. doi: 10.1111/j.1468-0009.2009.00548.x. PMID: 19298416; PMCID: PMC2879179.
32. Kumar S, Kelly AS, Steinberger J, et al. (2020). Nutrition in children and adolescents: A strategy for prevention of overweight and obesity. Global Heart, 15(1), 1-10.
33. Adegbola TA, Onabanjo OO, Lawal MA. (2019). Socio-economic and demographic factors affecting malnutrition among under-five children in rural communities in Nigeria. International Journal of Nursing and Midwifery, 11(6), 59-65.
34. Maniragaba, V.N., Atuhaire, L.K. & Rutayisire, P.C. Undernutrition among the children below five years of age in Uganda: a spatial analysis approach. *BMC Public Health* ***23***, 390 (2023). https://doi.org/10.1186/s12889-023-15214-9
35. Ukegbu PO, Uwaegbute AC, Obasi CC. (2017). Relationship between nutritional status and academic performance of students in some selected secondary schools in Rivers State, Nigeria. African Health Sciences, 17(3), 643-652.
36. Oguntona CRB, Akinsoyinu AO, Fajolu IB, Omotade OO. (2016). Food insecurity and the dietary patterns of rural children in Nigeria: the influence of socioeconomic factors. Nigerian Journal of Paediatrics, 43(1), 35-41.
37. Ajala AO, Abioye AI, Abiona TC, Oladunni A, Oluwayemi IO. (2019). Food insecurity and dietary diversity among rural and urban school children in Abeokuta, Nigeria. South African Journal of Clinical Nutrition, 32(4), 93-98.
38. Okafor, Uchechukwu & Omemu, Adebunkola & Adewale, Obadina & Bankole, Mobolaji & Adeyeye, Samuel. (2018). Nutritional composition and antinutritional properties of maize ogi cofermented with pigeon pea. Food Science & Nutrition. 6. 10.1002/fsn3.571.
39. Ojo AS, Nnyanzi LA, Giles EL, Ells L, Okeke SR, Ajayi KV, Bolarinwa OA. "I am not really into the government telling me what I need to eat": exploring dietary beliefs, knowledge, and practices among ethnically diverse communities in England. BMC Public Health. 2023 May 2;23(1):800. doi: 10.1186/s12889-023-15689-6. PMID: 37131140; PMCID: PMC10152749.
40. Ugboma HA, Osuorah CDI, Eneh AU, et al. (2019). Health-seeking behavior for under-five children among urban slum dwellers in southeastern Nigeria. Nigerian Journal of Clinical Practice, 22(8), 1075-1082.
41. Olatona FA, Onabanjo OO, Adeniji EO, et al. (2017). Determinants of malnutrition among primary school children residing in slum areas of a Nigerian city. Nigerian Journal of Paediatrics, 44(1), 35-41.
42. Olawoye OJ, Abioye-Kuteyi EA, Elegbede OE, et al. (2018). The effect of water, sanitation and hygiene interventions on the nutritional status of school-aged children in primary schools in Nigeria: a systematic review. Journal of Public Health in Africa, 9(2), 809.

43. Olumakaiye MF, Ogundare EO, Ogundare AT, et al. (2019). Water, sanitation and hygiene conditions and nutritional status of primary school children in rural southwest Nigeria: a cross-sectional study. BMC Public Health, 19(1), 1025.
44. Ugochukwu EF, Iloh GUP, Iloh ON, Amadi AN, Okafor GO. (2020). Community-based determinants of malnutrition among under-five children in a rural community in South-East Nigeria: a cross-sectional survey. African Journal of Primary Health Care & Family Medicine, 12(1), a2158.
45. Akinboye DO, Onabanjo OO, Faronbi JO. (2017). Effectiveness of nutrition education intervention on knowledge, attitude, and practice of nutritional habits among selected secondary school adolescents in Lagos State. Annals of Global Health, 83(1), 99-104.
46. Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, *23*(3), 263–280. https://doi.org/10.1037/a0032359
47. Kim SJ, Fernandez-Martinez J, Nudelman I, Shi Y, Zhang W, Raveh B, Herricks T, Slaughter BD, Hogan JA, Upla P, Chemmama IE, Pellarin R, Echeverria I, Shivaraju M, Chaudhury AS, Wang J, Williams R, Unruh JR, Greenberg CH, Jacobs EY, Yu Z, de la Cruz MJ, Mironska R, Stokes DL, Aitchison JD, Jarrold MF, Gerton JL, Ludtke SJ, Akey CW, Chait BT, Sali A, Rout MP. Integrative structure and functional anatomy of a nuclear pore complex. Nature. 2018 Mar 22;555(7697):475-482. doi: 10.1038/nature26003. Epub 2018 Mar 14. PMID: 29539637; PMCID: PMC6022767.
48. Lozoff B, Beard J, Connor J, Barbara F, Georgieff M, Schallert T. Long-lasting neural and behavioral effects of iron deficiency in infancy. Nutr Rev. 2006 May;64(5 Pt 2):S34-43; discussion S72-91. doi: 10.1301/nr.2006.may.s34-s43. PMID: 16770951; PMCID: PMC1540447.
49. Felt, Adrienne & Ha, Elizabeth & Egelman, Serge & Haney, Ariel & Chin, Erika & Wagner, David. (2012). Android permissions: User attention, comprehension, and behavior. SOUPS 2012 - Proceedings of the 8th Symposium on Usable Privacy and Security. 10.1145/2335356.2335360.
50. Black RE, Victora CG, Walker SP, et al. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. The Lancet, 382(9890), 427-451.

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