

Fit India - A millennium Mantra

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Abstract

The true measure of any nation's standing is how well it attends to its children - their health and safety, their material security, their education and socialisation and their sense of being loved, valued, and included in the families and societies into which they were born (UNICEF, 2007). It would amount to no exaggeration that children form a key component in the development narrative, with health having positive effects on the overall status of national sectors ranging from public health to economy. Being the second most populated country in the world, the situation is even more alarming in India. Statistics shows that 5.74% to 8.82% school children in India are obese (Indian Journal of Endocrinology and Metabolism) Children's health is becoming a matter of global concern.

The physical fitness of children is a crucial project that has been enthusiastically endorsed by governments, multilateral development organisations and a range of NGOs and researchers. Article 39 (f) of the Indian Constitution directs the State to ensure that children are given opportunities and facilities to develop in a healthy manner and in conditions of freedom and dignity and that childhood and youth are protected against exploitation and against moral and material abandonment. The paper attempts to create awareness among the academicians and stakeholders towards the need of active living among the children up to the age of 18 years by i) studying the patterns and current status of Active living among Indian children .ii) evaluate the policies and programmes envisaged for active living iii) evaluate the impediments in the success of programmes and initiatives of active living and suggest measures for improving the health status of children through physical fitness.

Children's health is becoming a matter of global concern. With more than a third of its population below the age of 18, India has the largest child population in the world. This backgrounder explores the levels of health, nutrition, education and social security of children, and government policy and action on child rights. India has made some significant commitments towards ensuring the basic rights of children. There has been progress in overall indicators: infant mortality rates are down, child survival is up, literacy rates have improved and school dropout rates have fallen. But the issue of child rights in India is still caught between legal and policy commitments to children on the one hand, and the fallout of the process of globalisation on the other.

Over the last decade, countries across the world have been changing their existing economic models in favour of one driven by the free market, incorporating processes of liberalisation, privatisation and globalisation. The direct impact of free trade on children may not leap to the eye, but we do know that globalised India is witnessing worsening levels of basic health, nutrition and shelter. Children are suffering as a result of social sector cutbacks/policies and programmes and development initiatives

that deprive communities and families of access to and control over land, forest and water resources they have traditionally depended on.

Children's health is becoming a matter of global concern. According to the World Health Organisation obese children tend to fall prey to lifestyle diseases to the extent of 60-70% when they reach their 30s and 40s (the most productive years of their lives) A study published in Paediatrics Obesity predicts that India will have about 17 million obese children by 2025. Another study shows that about 97,000 children in India suffer from type 1 diabetes. "It's estimated that a child 20 years from now is likely to suffer from diabetes and heart diseases which becomes unpreventable during adulthood. They can only be controlled," (CEO and Co Founder, Fitterfly)

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PHYSICAL ACTIVITY is an essential aspect of our life towards achieving optimum health and wellbeing. Physical activity simply means movement of the body that consumes energy. According to the World Health Organization (WHO) physical activity is defined as 'any bodily movement produced by skeletal muscles that requires energy expenditure' (such as activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational actions -dance, yoga, tai chi).

All forms of physical activity ensure health benefits if carried out regularly, in sufficient duration and requisite intensity. At all times advantages of being physically active outweigh potential harm irrespective of gender and age.

The term physical activity should not be confused with exercise, which is the subgroup of physical activity. Exercise is planned, organized, repetitive movements carried out to sustain or improve health and fitness. Apart from exercise, any other physical activity that is done during leisure time, for getting transport to and from places, doing (paid or unpaid) domestic tasks or as part of a person's work (lifting, carrying or other active tasks), and recreation has a health benefit. By becoming some active throughout the day in relatively simple ways is more beneficial than doing none. Some small changes in daily routine can make a difference. Taking stairs instead of elevators, walking or using a bicycle instead of driving to neighbourhood grocery shop, milk booth; such types of changes in everyday life can keep us healthy. Moreover, the health benefits of physical activity are maintained only with regular practice. Regular physical activity reduces the risk of non-communicable diseases- ischemic heart disease, hypertension, stroke, diabetes, breast and colon cancer, depression. At the same time, it prevents obesity, and leads to good mental health.

Physical activity has health, social and economic benefits. Efforts and strategies to promote physical activity will directly contribute to achieving the target of 15% relative reduction in the global prevalence of physical inactivity in adults and in adolescents by 2030 and achieving many of the 2030 Sustainable Development Goals (SDGs).

PHYSICAL INACTIVITY

Physical inactivity (or insufficient physical activity) is one of the leading risk factors for various non-communicable diseases (NCDs), injuries and premature deaths worldwide. To individuals who are not sufficiently physically active are prone to the risk of cardiovascular diseases, diabetes, cancer is 20-30% more compared to people who are sufficiently active. Physical inactivity also shortens the life span by 3-4 years. Thus resulting in increased economic expenditure on medical care, loss of productivity and social dependence.

Globally, about 23% of adults and more than 80% of adolescents were insufficiently Physical inactivity is more common among wealthier countries and among women and elderly individuals.

Physical activity's benefits have been well established and regular moderate to vigorous intensity physical activity can reduce the risk of cardiovascular diseases, metabolic syndrome, colon and breast cancer, and depression.(World Health Organization) Regular physical activity can also help control weight, improve mood, and increase life expectancy. Despite the clear benefits associated with physical activity, existing evidence points towards a physical inactivity epidemic among children and youth in India, where a predominant proportion of this population does not meet physical activity guidelines (India-Report card 2016)This epidemic could be attributed to multiple factors including lack of upstream active living policies, built environment that promotes sedentary behaviour and limits opportunities for active transport, and increasing use of sedentary technologies(Sridhar GR, Kumar PS, Venkata P, et al.2010;Millward Brown Study 2016).

The exploration of the research literature shows that there is dearth of studies and research conducted in this field. To address current gaps in evidence, and serve as a tool to influence child and youth-focused active living programmes and policies in India, The present study was conducted towards this most pertinent and crucial problem.

Objectives 1)To study the present status and trends in the the current state of active living, and 2) Create awareness among the academicians and stakeholders towards active living policies and programmes 3) To evaluate government initiatives and strategies towards active living through school education.

Present status and Trends in the the current state of Active living:

India Report Card is one such endeavour towards the inception of active living research. The 2016 India Report Card on Physical Activity for Children and Youth is the first comprehensive assessment of physical activity and sedentary behaviour among Indian children and youth. It is part of Global Matrix 2.0, an international endeavour to evaluate various aspects of active living in 38 countries spread across six continents (representing 60% of the world's population). Current evidence was appraised using rigorous methods and assigned standardized grades to developed indicators of active living. Ten indicators were selected for evaluation. After reviewing the urban and rural data sources, The 2018 India Report Card shows that although the vast majority of children and youth in India are not accumulating recommended levels of physical activity, there are encouraging signs of their participation in active transportation and active play—a phenomenon that needs to be explored further to facilitate more physical activity. Research demonstrates that

almost half of children and youth in India do not meet recommended guidelines for physical activity and sedentary behaviour.(Katapally TR, Goenka S, Bhawra J, et al. 2016) The 2016 India Report Card identified several gaps in evidence, including nationally representative data on active living and contextual indicators such as “Active Play” and “Family and Peers.” With India’s youth projected to be a major proportion of the world’s workforce,(IRIS Knowledge Foundation2018;Oyelaran-Oyeyinka.O.2012)evaluating active living in India has implications for the world economy.

The 2018 India Report Card addressed most of the gaps in evidence identified by the 2016 Report Card; however, it reiterated the need for nationally representative active living research, and renewed government strategies and investments to facilitate active living among children and youth. Although a major proportion of the children and youth in India appear to participate in active transportation, they are not meeting recommended physical activity and sedentary behaviour guidelines.(Guthold R, Cowan MJ, Autenrieth CS, Kann L, Riley LM,2010;Shridhar K, Millett C, Laverty AA, et al.2017;Mohan A & Harish R. 2018). Physical activity type and levels varied significantly across the intersection of gender and socio -economic status, with girls belonging to lower socioeconomic status having the greatest disadvantage due to cultural and safety perceptions.(Gregori D, Gulati A, Paramesh EC, et al. 2014). Based on the grades assigned to “Family and Peers” (D), “Community and Built Environment”(D), and “Government”(D), the active living challenges faced by Indian children and youth could be attributed to lack of adequate political, social, and physical environmental support.

Table-Summary of Report Card Indicators and Grades (2016 &2018)

S.no	Indicator	Guidelines	Grade(2016)	Grade(2018)
1	Overall Physical Activity	<i>Moderate-to-vigorous-intensity physical activity daily.</i>	C 41-60%	D 20-41%
2	Organized Sport Participation	<i>Organized sport and/or physical activity programs.</i>	Incomplete or insufficient information	Incomplete or insufficient information
3	Active Play	<i>Unstructured or unorganized active play for several hours per day.</i>	Incomplete or insufficient information	C 41-60%
4	Active Transportation	<i>walk or bike to different destinations (school, home)</i>	C 41-60%	B
5	Sedentary Behaviour	<i>recreational screen time 2 hours per</i>	C 41-60%	C 41-60%

		<i>day(TV, computer electronic games)</i>		
6	Family and Peers	<i>facilitate physical activity and sport opportunities</i>	Incomplete or insufficient information	F
7	School – Infrastructure, Policies and Programs	<i>150 minutes per week of physical education</i>	Incomplete or insufficient information	D 21-40%
8	Community and the Built Environment	<i>well-maintained facilities, parks, and playgrounds which are also safe</i>	Incomplete or insufficient information	incomplete or insufficient information
9	Government – Strategies, Policies and Investments	<i>Demonstrated leadership, investments, and evidence of implementation of physical activity strategies targeting children and youth.</i>	D 21-40%	D 21-40%
10	Physical Fitness	<i>children and youth performing well in several fitness tests and exercise regimens meant to test physical fitness</i>	Incomplete or insufficient information	D 21-40%

Source-2016 India Report Card
2018 India Report Card

GOVERNMENT INITIATIVES

Fit India Movement is a nation-wide movement in India to encourage people to remain healthy and fit by including physical activities and sports in their daily lives. It was launched by Prime Minister of India Narendra Modi at Indira Gandhi Stadium in New Delhi on 29 August 2019 (National Sports Day).

Grants for the fitness equipment A committee composed of various government officials, members of Indian Olympic Association (IOA), national sports federations, private bodies and fitness promoters has been formed. As per union HRD department directive states and union territories can request for funds as per guidelines to procure listed fitness items for children studying in government schools. The equipment purchased from the grants are to be maintained in workable condition by the authorities concerned. It is also mandated to keep record of working, repairable and

damaged beyond repair equipment. The schools are also allowed to include their traditional and regional games.

Fit India grading for schools In November 2019, the PM announced that they will rank them in order of fitness. Eligible schools can apply for ranking and once confirmed they will be allowed to use the Fit India logo and flag.

Institutions & Individuals representatives of private bodies such as Confederation of Indian Industries (CII), Reliance Foundation, JSW Cement and JSW Paints, SE TransStadia Pvt. Ltd., Tata Trust, ASSOCHAM India, Federation of Indian Chambers of Commerce & Industry (FICCI), government institutions like Ministry Of Defence, Sainik School Society along with actors Shilpa Shetty and Milind Soman etc. are part of this campaign

Investments at National, State, local jurisdictional, and school and community levels Targeted investments are required at multiple jurisdictional levels (national, state and local) and at multiple levels of context (schools and neighbourhoods) to influence a significant change in current levels of physical activity and sedentary behaviour in children and youth. (2016 India Report Card)

Culturally and geographically appropriate policy: India is a culturally and geographically diverse nation; hence policy interventions need to take this diversity into account. A “one size fits all” strategy will not work, thus municipal, state, and national-level policies need to be tailored according to cultural and geographic differences. (2016 India Report Card)

Urban planning policy: There are numerous barriers to physical activity in the built environment, and a national survey identified Indian cities as having low walk ability ratings, as well as high air pollution. Evidence-based local urban planning policy is critical to facilitate active living and minimize existing barriers. (2016 India Report Card)

PHYSICALLY ACTIVE AND ENCOURAGING PARENTS

Families and Peers play an important role in providing children and youth opportunities to be physically active. Parents by being a role model themselves can contribute in a big way towards developing healthy habits in the children. Adults or kids can organize active play. There are active indoor games such as hopscotch, jump rope, dodge ball, Frisbee golf, and badminton, volleyball, swimming or skating. Different children excel at and enjoy different types of activities. They should be free to experiment with individual sports and activities to select one of their interests and should be encouraged to pursue at school, state and regional levels. Children should be encouraged to participate in active outdoor chores such as raking leaves, pulling weeds, watering plants, sweeping the walks or cleaning the garage.

Monitored Screen Time

When going to play outside isn't an option, interactive video games that require physical activity such as tennis, bowling or baseball can be encouraged, dance videos and active video games for some physically-active television time can be played. Screen time for children should be monitored by the parents and should not exceed the requisite time of 60 minutes per day.

Active Role Model

Present physical activity as an important time to take care of your body and health, rather than a chore. Parents should find activities that they enjoy and be active for at least 30 minutes five days a week. Current evidence indicates that children and youth who use active transportation accumulate more physical activity and have better health outcomes in comparison with those who are passive during transportation (e.g.

car/bus travel) (Mendoza JA, Watson K, Nguyen N, Activeet al. 2011;Ostergaard L, Kolle E, Steene-Johannessen J, et al 2013; Pizarro AN, Ribeiro JC, et al 2013) commuting to school and association with physical activity and adiposity among U.S. youth. Moreover, active transportation's benefits extend beyond physical health as it increases social interaction, reduces road congestion, saves money on gas and parking, and more importantly, can contribute towards reduction in greenhouse gas emissions.(Public Health Agency of Canada Web,2014)

Reducing sedentary behaviour

According to accelerometry-based ISCOLE studies in the city of Bengaluru, children aged 9 to 11 years spent an average of nine hours of their waking time in sedentary pursuits (Denstal KD, Broyles ST, Larouche R, et al.2015; Chaput JP, Katzmarzyk PT, LeBlanc AG, et al. 2015) A study that utilized accelerometer data showed that children aged 6 to 10 years living in or around the city of Mysore were sedentary for an average of 5.3 hours per day.(Larouche R, Sarmiento OL, Broyles ST, et al 2015). A study conducted in the city of New Delhi showed that children and youth aged 8 to 15 years accumulated less than 1 hour/day of screen time Similarly, a study conducted in seven major urban centres (Bengaluru, Chennai, Hyderabad, Kolkata, Mumbai, New Delhi and Surat) reported that children aged 3 to 11 years spent, on average, less than 1.4 hours/day watching television and less than 1 hour/week playing video games).

Children can be highly active and highly sedentary on the same day! Irrespective of the amount of physical activity children accumulate, they could still spend a lot of time in sedentary pursuits such as watching television.(Katapally TR, Muhajarine N. 2015)Taking this observation into consideration is important because increasingly, evidence suggests that independent of physical activity levels, sedentary behaviours are associated with increased risk of both physiological and psychological problems.(Tremblay MS, LeBlanc AG, Kho ME, et al. 2011) Watching television for more than 2 hours per day has been associated with unhealthy body composition, decreased fitness, low self-esteem, and decreased academic achievement. Fortunately, evidence also suggests that decreasing any type of sedentary behaviour is associated with lower health risk in children and youth.(Tremblay MS, LeBlanc AG, Kho ME, et al. 2011) Moreover, with evidence now emerging that sedentary behaviour embedded in childhood can continue through adolescence into adulthood,(Biddle SJH, Pearson N, Ross GM, et al., 2010) it is imperative to focus on curbing sedentary behaviour in children see that you are enjoying time being active, they will be more likely to model your behaviour.

PHYSICAL EDUCATION (PE) :AN INTEGRAL PART OF SCHOOL CURRICULUM

Physical Education (PE) is often viewed as a marginal subject within the curriculum. And many secondary schools actively reduce PE time to make way for what are deemed more “serious” or “important” subjects. 38% of English secondary schools have cut timetabled PE for 14- to 16-year-olds. One of the main reasons for this is the increased pressure to produce exam results. Much of the time pupils would usually spend in PE lessons is now spent receiving extra tutoring on topics other than PE.(**Research from the Youth Sport Trust**)PE is also praised for its contribution to improved psychological health, for helping to nurture social and moral development – as well as supporting cognitive and academic performance.

The Association for Physical Education maintains that high quality PE fosters the physical, moral, social, emotional, cultural and intellectual development of pupils. But there are many myths about this otherwise important subject that it offers more

entertainment than education and not meant for intellectually intelligent children (sportanddev.org 2015). There is a growing evidence base to suggest that physical activity has the potential to support learning more broadly. But the role of PE is not merely to prop up and support pupils' learning in other subjects. It is sad that the grades on physical education are not given the weightage equivalent to other subjects, intellectual and academic value of PE itself is largely overlooked. This is the main reason that **most** schools in India have failed to integrate structured physical education (PE) into the school's curriculum.

For healthy lifestyles, children need both free play and specific instruction on physical skills. An easy way for kids to meet this goal is by participating in physical education as part of the school day. In addition to supporting daily physical education in schools, many communities offer classes you can take advantage of, such as swimming or dance lessons. The best physical education is age appropriate and fun. PE must be utilised as an effective tool for the holistic development of India's children, from diverse socio-economic backgrounds. For such a young and socio-economically diverse population, PE through schools can become a powerful holistic development tool for India's children.

CONCLUSION

PE, sport and physical culture each offer a unique platform on which to explore a multitude of holistic learning opportunities. The spiralling downtrend of PE time in secondary schools is a major cause for concern and it would seem that PE is in urgent need of an overhaul by providing many opportunities for cross-curricular links and integrative learning in PE. The obvious benefit of PE, of keeping children fit, active and healthy, is particularly important for children living in urban India, from stronger economic backgrounds, where obesity has become a major issue. Fifteen million children (8-18 year) residing in Indian cities are overweight (Misra et al, 2011). The Lancet study in 2012 revealed that suicide rates in India are highest among the 15-29 age group, whereas the National Crime Records Bureau in 2011 showed that failure in examinations is the second likeliest cause of suicides among children in India. PE can help children to deal constructively with this competitive environment that is prevalent in Indian society. Children living in rural India, from weaker economic backgrounds, and in particular girls, are marginalised groups who receive limited exposure and opportunities, and will greatly benefit from the social benefits of PE. It is important that the various stakeholders of schools, including management, teachers, parents, students and the education ministry recognise the role that PE can play in the development of children, and prepare a roadmap to introduce structured PE programmes in schools across India. If India is to make significant progress in active living among children and youth, the recommendations are to be implemented in concert, where there is interplay between multiple aspects of these action items.

REFERENCES

Biddle SJH, Pearson N, Ross GM, et al.(2010) Tracking of sedentary behaviours of young people: a systematic review. *Prev Med*, 51: 345-351.

Central Board of Secondary Education. Circular No. 71 Acad-20/2012, 2012. New Delhi: Government of India

Centres for Disease Control and Prevention (2003). Physical activity levels among children aged 9 to 13 years. *Morbidity & Mortality Weekly Report*. 785-788.

Clean Air Initiative for Asian Cities Centre. Walkability in Indian cities. New Delhi: Clean Air InitiativeforAsian Cities Center; retrieved from: http://cleanairasia.org/wp-content/uploads/portal/files/Walkability-India_SEP.

Chaput JP, Katzmarzyk PT, LeBlanc AG, et al.(2015) Associations between sleep patterns and lifestyle behaviours in children: an international comparison. *Int J Obes Suppl* ; 5: 559-565.

Colley RC, Brownrigg M, & Tremblay MS(2012). A model of knowledge translation in health: the Active Healthy Kids Canada report card on physical activity for children and youth. *Health PromotPract*, 13(3): 320-330.

Data on language Government of India, Ministry Home Affairs retrieved from.http://www.censusindia.gov.in/Census_Data_2001/Census_Data_Online/Language/data_on_language

Denstal KD, Broyles ST, Larouche R, et al.(2015) Active school transport and weekday physical activity in 9-11 year old children from 12 countries. *Int J Obes Suppl* ; 5: 100-S106

Giles-Corti B, Kelty SF, Zubrick SR, Villanueva KP.(2009) Encouraging walking for transport and physical activity in children and adolescents. How important is the built environment? *Sports Med* ; 39(12): 995-1009.

Gregori D, Gulati A, Paramesh EC, et al.(2014) Cross-regional analysis of multiple factors associated with childhood obesity in India: a national or local challenge? *Indian J Pediatr.* ;81

Guthold R, Cowan MJ, Autenrieth CS, Kann L, Riley LM (2010). Physical activity and sedentary behavior among schoolchildren: a 34-country comparison. *J Pediatr.* ; 157:43–49. doi:10.1016/j.jpeds.2010.01.019

Gulati A, Hochdorn A, Paramesh H, et al(2014). Physical activity patterns among school children in India. *Indian J Pediatr*, 81 Suppl 1: 47-54.

Gustafson SL, Rhodes RE(2006). Parental correlates of physical activity in children and early adolescents. *Sports Med* 36(1):79- 97.

Global recommendations on physical activity for health (2011) 5-17 years old. World Health Organization Website.retrieved from <http://www.who.int/dietphysicalactivity/physical-activity-recommendations-5-17years.pdf>.

Hume C, Salmon J, Ball K.(2005) Children's perceptions of their home and neighborhood environments, and their association with objectively measured physical activity: a qualitative and quantitative study. *Health Education and Research* ; 20(1): 1-13.

Report Card cover(2018) Journal of Physical Activity and Health 15 retrieved from, s2; 10.1123/jpah.2018-0475

IRIS Knowledge Foundation.(2013) State of urban youth, Mumbai, India 2012. Retrieved from <http://www.esocialsciences.org/general/a201341118>

Johnson Shoyama Graduate School of Public Policy, Canada and the Public Health Foundation of India. (2016)The 2016 India Report Card on Physical Activity for Children and Youth

Katapally TR, Goenka S, Bhawra J, et al.(2016) Results from India's 2016 report card on physical activity for children and youth. *J Phys Act Health.*;13(11 suppl 2):S176–S182. doi:10.1123/jpah.2016-0393

Katapally TR, Muhajarine N.(2015) Capturing the interrelationship between objectively measured physical activity and sedentary behaviour in children in the context of diverse environmental exposures. *Int J Environ Res Public Health*, 12(9), 10995- 11011.

Kehoe SH, Krishnaveni GV, Veena SR, et al(2012). Birth size and physical activity in a cohort of Indian children aged 6-10 years. *J Dev Orig Health Dis*, 2012;3(4): 245-252.

Larouche R, Sarmiento OL, Broyles ST, et al(2015). Are the correlates of active school transport context-specific? *Int J Obes Suppl*, ; 5: 589-59

Mendoza JA, Watson K, Nguyen N, Cerin E, Baranowski T, Nicklas TA(2011). Active commuting to school and association with physical activity and adiposity among U.S. youth. *J Phys Act Health*, ; 8:488-95

Ministry of Youth Affairs and Sports.(2016) National SportsDevelopment Code of India. New Delhi:GovernmentofIndia;Available at: <http://yas.nic.in/sites/default/files/File918>.

Millward Brown Study: Indian multi screen users consume over six hours of screen media daily. Afaqs! Web site. http://www.afaqs.com/all/news/images/news_story_grfx/2014/05/40768/

Moore LL, Lombardi DA, White MJ, Campbell JL, Oliveria SA, Ellison RC.(1991) Influence of parents

Mohan A, Harish R.(2018) Status of physical activity among children and youth in Chennai India: Results from the ORANGE study. [Working paper]. physical activity levels on activity levels of young children. *J Pediatr*, ;118:215-219.

National ambient air quality status and trends-2012. Central Pollution Control Board Web site.retrievedfromhttp://www.cpcb.nic.in/divisionsofheadoffice/pams/NAAQStatus_Trend_Report_2012.pdf

National Consultation on WHO's (2006)Global Strategy on Diet, Physical Activity and Health. Recommendations for a national plan of action for the implementation of WHO's global strategy on diet, physical activity and health in India.

Ostergaard L, Kalle E, Steene-Johannessen J, Anderssen SA, Andersen LB.(2013) Cross-sectional analysis of the association between mode of school transportation and physical fitness in children and adolescents. *Int J Behav Nutr Phys Act*,; 10:91

Oyelaran-Oyeyinka O. (2012). State of the urban youth 2012/2013. Nairobi, Kenya: United National Human Settlements Programme.

Pizarro AN, Ribeiro JC, Marques EA, Mota J, Santos MP.(2013) Is walking to school associated with improved metabolic health? *Int J Behav Nutr Phys Act*, 10:12.

Rani MA, Sathiyasekaran BWC(2013). Behavioural determinants for obesity: a cross-sectional study among urban adolescents in India. *J Prev Med Public Health.* ;46:192–200. doi:10.3961/jpmph.2013.46.4.192

Sarmiento OL, Lemoine P, Gonzalez SA, et al.(2015) Relationship between active school transport and adiposity indicators in school age children from low-, middle- and high-income countries. *Int J Obes Suppl.* ; 5: S107-S114.

Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Med Sci Sports Exerc.*; 32:963-75

Shridhar K, Millett C, Laverty AA, et al.(2016) Prevalence and correlates of achieving recommended physical activity levels among children living in rural South Asia– A multi-centre study. *BMC Pub Health.* 16:990. doi:10.1186/s12889-016-3353-x

Silva DAS, Chaput JP, Katzmarzyk PT, et al.(2018) Physical education classes, physical activity, and sedentary behavior in children. *Med Sci Sports Exerc.* ; 50(5):995–1004. doi:10.1249/MSS.0000000000001524

Swaminathan S, Selvam S, Thomas T, Kurpad AV, Vaz M(2011) Longitudinal trends in physical activity in selected urban south Indian school children. *Indian J Med Res* ; 134: 174-180.

Timperio A, Crawford D, Telford A, Salmon J.(2004) Perceptions about the local neighborhood and walking and cycling among children. *Preventive Medicine* 38(1): 39-47

Tremblay MS, LeBlanc AG, Kho ME, et al. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *Int J Behav Nutr Phys Act*, 2011; 8: 98

Vaz M, Pauline M, Unni US, et al(2011). Micronutrient supplementation improves physical performance measures in Asian Indian school-age children. *J Nutr.* ; 141: 2017-2023.

Vaz M, Swaminathan S, Rajaraman D, Kuriyan R(2015). Overweight and obesity in Asian Indian children in India and Canada: multi-level determinants, functional consequences, and novel mechanisms. Ref No. 58/4/2/ICMR-CIHR/2009/NCD-II (IRIS No: 2009–09540. Indian Council of Medical Research

What is active transportation? Public Health Agency of Canada Web site retrieved from <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/paap/at-ta-eng.php>.