Results From India's 2016 Report Card on Physical Activity for Children and Youth

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Background: Physical inactivity in children and youth in India is a major public health problem. The 2016 Indian Report Card on Physical Activity for Children and Youth has been conceptualized to highlight this epidemic by appraising behaviors, contexts, strategies, and investments related to physical activity of Indian children and youth. **Methods:** An international research collaboration resulted in the formation of a Research Working Group (RWG). RWG determined key indicators; identified, synthesized, and analyzed existing evidence; developed criteria for assigning grades; and, finally, assigned grades to indicators based on consensus. **Results:** Overall Physical Activity Levels were assigned a grade of *C-*. Active Transportation and Sedentary Behaviors were both assigned a grade of *C*. Government Strategies and Investments was assigned a grade of *D*. Six other indicators, including the country-specific indicator Physical Fitness, were graded as *INC* (incomplete) due to the lack of nationally representative evidence. **Conclusions:** Based on existing evidence, it appears that most Indian children do not achieve recommended levels of physical activity and spend most of their day in sedentary pursuits. The report card identifies gaps in both investments and research that need to be addressed before understanding the complete picture of active living in children and youth in India.

Keywords: active living, knowledge translation, evidence appraisal, health communication, advocacy

Physical activity's benefits have been well established and regular moderate-to-vigorous intensity physical activity (MVPA) can reduce the risk of cardiovascular diseases, metabolic syndrome, colon and breast cancer, and depression.^{1,2} Regular physical activity (PA) can also help control weight, improve mood and increase life expectancy.^{1,2} Despite the clear benefits associated with PA, existing evidence points toward a physical inactivity epidemic among children and youth in India, where a predominant proportion of this population does not meet PA guidelines.³⁻⁵ This epidemic could be attributed to multiple factors including lack of upstream active living policies, built environment that promotes sedentary behavior and limits opportunities for active transport, and increasing use of sedentary technologies.^{6,7}

Thus, it is important to influence and inform national and regional policy makers in developing population-based, multisectoral policies that drive active living among children and youth.

The aims of the first Indian Report Card on Physical Activity for Children and Youth are to 1) evaluate and translate the current state of active living, and 2) serve as a tool to advocate for and inform active living policies and programming in India. For the purpose of this Report Card, children and youth are defined as individuals below 18 years of age. The Report Card assigns globally standardized grades to previously defined and developed evidence-based indicators that capture multilevel factors including behaviors, contexts, strategies and investments.⁸ The 2016 Report Card was developed and produced by a team of international academics and researchers in collaboration with Johnson Shoyama Graduate School of Public Policy, Active Healthy Kids Canada, and the Public Health Foundation of India.

The purpose of this manuscript is to present the methods, summarize the results and discuss the implications of the 2016 Indian Report Card. The report card was generated by appraising data assembled from a number of national and regional surveys deployed since 2004.

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Methods

The 2016 Indian Report Card was initiated after an invitation from Active Healthy Kids Canada. Tarun Reddy Katapally (TRK) of Johnson Shoyama Graduate School of Public Policy, Canada, under the guidance of Dr. Mark Tremblay of Healthy Active Living and Obesity Research Group, Canada, established a collaboration with Shifalika Goenka (SG) of the Public Health Foundation of India. Thereafter, an international Report Card Research Working Group (RWG) comprised of 9 experts from 7 universities and institutions was established. TRK led the development of the Report Card, including acquiring funding, identifying and interpreting data, and was primarily responsible for conceptualization, design, and

production of the Report Card. SG coled report card production, including identification and interpretation of data. Jasmin Bhawra (JB) identified and interpreted data, coconceptualized and produced the Report Card. Subha Mani, Sarah Helen Kehoe, Ghattu V Krishnaveni, Anjana Sankhil Lamkang and Manu Raj identified, provided, and interpreted data. Kathy McNutt (KM) acquired funding and identified and interpreted data. TRK, SG, JB, and KM are responsible for media strategy and dissemination of the report card. The 2016 Indian Report Card appraised the 9 previously developed core indicators (Overall Physical Activity Levels, Organized Sport Participation, Active Play, Active Transportation, Sedentary Behavior, Family and Peers, School, Community and the Built Environment, Government Strategies and Investments) and added 1 new indicator specific to India: Physical Fitness.⁸ Physical Fitness includes 6 components: cardio respiratory endurance, muscular strength, muscular endurance, flexibility, explosive strength, and body composition (body mass index or percentage of body fat). Physical fitness is assessed using a variety of tests and exercise regimens. The rationale for including this indicator is the focus on measures of physical fitness in schools across India.^{9,10}

Each indicator was assessed against parameters provided by Active Healthy Kids Global Alliance (Table 1).⁸ For example, overall PA levels were assessed based on the proportion of children and youth who met PA guidelines. Moreover, trends over time and disparities in evidence were taken into consideration while appraising the indicators. Peer-reviewed data sources were appraised based on representativeness, sample size, quality of the data (ie, design, subjective versus objective, sampling frame, data collection and analysis), and timeliness (ie, how recent the data set is). Gray literature was appraised based on comprehensiveness, validity of the sources cited, representativeness, and the organization producing the evidence (ie, independent versus nonindependent). Nationally representative data were given a higher weightage, followed by published data, unpublished data, and gray literature.

One national survey,⁴ several state (ie, province) and city-level surveys,^{11–18} as well as baseline data from an ongoing longitudinal state-level survey¹⁹ were used as data sources for the 2016 Indian Report Card. In addition, we also reviewed appropriate gray literature to complete the grading process.^{9,20–23} Nationally representative and validated state-based surveys were given greater weightage in assigning grades. Members of the RWG collated and appraised the available evidence, and assigned grades for each indicator based on consensus. Peer-reviewed literature was assessed based on representativeness (eg, city or state-level versus national data, as well as diversity of sample based on demographic characteristics), sample size, how recently the data were collected, and data quality (eg, design, subjective versus objective data collection, sampling frame, data analysis). Gray literature was weighted based on comprehensiveness and strength of the evidence cited, representativeness, and source of the evidence (ie, independent organizations versus those with vested interests). Grades were then assigned using the framework employed by Active Healthy Kids Canada Report Card (*A* = 81% to 100%; *B* = 61% to 80%; *C* = 41% to 60%; *D* = 21% to 40%; *F* = 0% to 20%; *INC* = incomplete data).⁸

A key purpose of this report card is to generate media interest to maximize knowledge dissemination and aid advocacy for active living.⁸ An important component of this effort is the development of an effective media strategy to drive the vision and message of the report card. To achieve this, our cover story is “It is time for India to step up for its children’s physical activity” (Figure 1).

Results and Discussion

The 2016 Indian Report Card is the first assessment of PA of its kind in India and will provide a baseline assessment for future report cards. Table 2 describes the general rubric for assignment of report card grades. Grades for each indicator are summarized in Table 3.

Our cover story, “It is time for India to step up for its children’s physical activity,” has been selected not only to highlight the dearth of active living research in India, but also the need for India’s children to be active and healthy as they will make up a major proportion of the world’s work force.^{24,25} From this report card, it is apparent that there are several gaps in evidence and more data are needed to understand the big picture of active living of children in India. The cover story also emphasizes why more research is needed (ie, to develop policies and programs to keep India’s next generation of adults healthy and productive). Grades for the report card indicators are described in the sections below.

Overall Physical Activity: C-

Overall Physical Activity refers to the proportion of children and youth meeting existing PA guidelines.²⁶ To ascertain overall PA, a number of urban data sources and a large rural dataset were appraised. The nationally representative Global School-Based Student Health Survey, administered in all Central Board of Secondary Education schools between 2003 and 2007 (*n* = 6130), depicts that 37.5% of children aged between 13 and 15 years accumulated recommended levels of PA.⁴ Gulati et al conducted a study among children aged 3 to 11 years (*n* = 1680) in 7 major urban centers in India (Bengaluru, Chennai, Hyderabad, Kolkata, Mumbai, New Delhi and Surat), which showed that only 17% of children met PA guidelines.⁵ Swaminathan et al studied children aged between 8 and 15 years (*n* = 307) in the city of New Delhi to determine that, on average, boys and girls accumulate 66 and 58.6 minutes of MVPA per day, respectively.¹¹ Similarly, Vaz et al found that 7- to 11-year-olds (*n* = 300) in the city of Bengaluru accumulated 61.5 minutes of MVPA/day on average.¹² Several accelerometry studies have also been conducted including the International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE).^{13–15} All ISCOLE studies in India were conducted in Bengaluru with the same cohort of 9 to 11 year old children with varying sample sizes (ie, Denstal et al [*n* = 546]; Sarmiento et al [*n* = 599]; Chaput et al [*n* = 433]).^{13–15} These studies demonstrate that children accumulate between 40 and 50 minutes of MVPA per day on average.^{13–15}

Apart from these peer-reviewed studies, we also appraised Mani et al’s rural baseline survey data from a large state-level longitudinal study.¹⁹ These data showed that a major proportion of rural children (*n* = 20,000) in the states of Andhra Pradesh and Maharashtra participate in outdoor sports and active transportation.¹⁹ This evidence suggests that rural children are more likely to achieve the recommended PA guidelines.¹⁹ After reviewing the urban and rural data sources, a grade of *C-* was assigned as it appears that roughly half of children and youth are meeting PA guidelines.

Organized Sport Participation: INC

Organized Sport Participation includes involvement in any programming provided through schools and/or communities that enables children and youth to participate in sports activities either for free or via a paid-for service. Organized sports programming is available

Table 1 Report Card Indicators and Parameters

Indicator	Parameters
Overall Physical Activity	% of children and youth who meet physical activity guidelines
Organized Sport Participation	% of children and youth who participate in organized sport and/or physical activity programs
Active Play	% of children and youth who engage in unstructured/unorganized active play for several hours a day
Active Transportation	% of children and youth who use active transportation to get to and from places (school, park, mall, friend's place)
Sedentary Behavior	% of children and youth who meet sedentary behavior or screen-time guidelines
Family and Peers	% of parents who facilitate physical activity and sport opportunities for their children (eg, volunteering, coaching, driving, paying for membership fees and equipment)
	% of parents who meet the physical activity guidelines for adults
	% of parents who are physically active with their kids
	% of children and youth with friends and peers who encourage and support them to be physically active
	% of children and youth who encourage and support their friends and peers to be physically active
	% of children and youth who encourage and support their friends and peers to be physically active
School	% of schools with active school policies (eg, daily physical activity, recess, "everyone plays" approach, bike racks at school, traffic calming on school property, outdoor time)
	% of schools where the majority ($\geq 80\%$) of students are taught by a physical education (PE) specialist
	% of schools where the majority ($\geq 80\%$) of students are offered at least 150 minutes of PE per week
	% of schools that offer physical activity opportunities (excluding PE) to the majority ($\geq 80\%$) of their students
	% of parents with children and youth who have access to physical activity opportunities at school in addition to PE
	% of schools with students who have regular access to facilities and equipment that support physical activity (eg, gymnasium, outdoor playgrounds, sporting fields, equipment in good condition)
Community and the Built Environment	% of children or parents who perceive their community/municipality is doing a good job at promoting physical activity (eg, variety, location, cost, quality)
	% of communities/municipalities that report they have policies promoting physical activity
	% of communities/municipalities that report infrastructure (eg, sidewalks, trails, paths, bike lanes) specifically geared toward promoting physical activity
	% of children or parents with facilities, programs, parks, and playgrounds available to them in their community
	% of children or parents living in a safe neighborhood where they can be physically active
	% of children or parents reporting well-maintained facilities, parks/playgrounds in their community that are safe
Government Strategies and Investments	% of children and youth who report being outdoors for several hours a day
	Evidence of leadership and commitment in providing physical activity opportunities for all children and youth
	Allocated funds and resources for the implementation of physical activity promotion strategies and initiatives for all children and youth
	Demonstrated progress through the key stages of public policy making (ie, policy agenda, policy formation, policy implementation, policy evaluation, and decisions about the future)
Physical Fitness*	Physical fitness includes 6 components: cardio respiratory endurance, muscular strength, muscular endurance, flexibility, explosive strength, and body composition (percentage of body fat)
	Assessed using a fitness program composed of a variety of tests and exercise regimens: sit-ups (# per minute), sit and reach (cms), modified pull up (# completed), mile run (min:sec), 4 × 10 m shuttle run test, standing vertical jump, standing broad jump, and height and weight (to calculate BMI)

Note. Adapted from Colley et al (2012).⁸

* New indicator.

The 2016 India Report Card on Physical Activity for Children and Youth

**JOHNSON
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GRADUATE SCHOOL OF PUBLIC POLICY
UREGINA USASK

Produced by a joint collaboration
between the Johnson Shoyama
Graduate School of Public
Policy, Canada and the Public
Health Foundation of India.

**PUBLIC
HEALTH
FOUNDATION
OF INDIA**

Figure 1 — Front cover of the 2016 Indian Report Card on Physical Activity for Children and Youth.

Table 2 Report Card Grading Rubric

Grade	Definition	Benchmark
A	We are succeeding with a large majority of children and youth	81–100%
B	We are succeeding with well over half of children and youth.	61–80%
C	We are succeeding with about half of children and youth.	41–60%
D	We are succeeding with less than half, but some, children and youth.	21–40%
F	We are succeeding with very few children and youth.	0–20%
INC	Incomplete. At the present time there is insufficient information available to establish a grade.	—

in many private and public schools across India. In addition to the sports programming described in Mani et al's rural study,¹⁹ a private organization that provides PA programming as a curriculum in 400 schools across 100 cities in India depicted a picture of children's organized sports participation both within and outside of school.^{10,20} However organized sport participation varies widely across India as there are differences in access not only between rural and urban

Table 3 Grades According to Physical Activity Indicator in the 2016 Indian Report Card on Physical Activity for Children and Youth

Indicator	Grades
Overall Physical Activity Levels	C-
Organized Sport Participation	INC
Active Play	INC
Active Transportation	C
Sedentary Behaviors	C
Family and Peers	INC
School	INC
Community and the Built Environment	INC
Government Strategies and Investments	D
Physical Fitness*	INC

Note. The grade for each indicator is based on the percentage of children and youth meeting a defined benchmark as described in Table 1.

* New indicator.

settings, but also between private and public schools, where privately funded schools have greater resources and better infrastructure to support organized sport. While these sources indicate that sports programming is gathering momentum, the data does not provide confidence to assign a nationwide grade as there is insufficient information available.

Active Play: INC

Active Play refers to unstructured or unorganized play. There were no credible data sources reporting the proportion of children and youth who engage in active play, hence a grade could not be assigned.

Active Transportation: C

Active Transportation encompasses the PA accumulated during transportation between different destinations (ie, between home and school). Based on data from the nationally representative Global School-Based Student Health Survey, approximately 57% of children aged 13 to 15 years participate in active transportation.⁴ Data from the ISCOLE studies showed that only 5.2% of children aged 9 to 11 years participated in active transportation.^{13,17} However, these data are at a local level (city of Bangalore), and younger children are less likely to accumulate PA via active transportation.²⁷ In a study conducted by Laxmaiah et al in the city of Hyderabad, approximately 47% of children aged 12 to 17 years (n = 1208) reported participation in active transportation.¹⁸

Mani et al's rural dataset showed a significantly high proportion (75%) of children and youth aged 8 to 14 years engaged in active transportation, thus suggesting that children in rural India may be more active due to increased opportunities to walk and/or cycle to school.¹⁹ Based on the available data, it appears that at least half of Indian children and youth engage in active transportation, hence a C grade was assigned.

Sedentary Behaviors: C

The Sedentary Behavior indicator captures the proportion of children and youth who meet sedentary behavior or screen-time

guidelines.^{28,29} According to accelerometry-based ISCOLE studies in the city of Bangaluru, children aged 9 to 11 years spent an average of 9 hours of their waking time in sedentary pursuits.^{13,14} Kehoe et al used accelerometer data showing that children aged 6 to 10 years ($n = 415$) living in or around the city of Mysuru were sedentary for an average of 5.3 hours per day.¹⁶ Swaminathan et al studied sedentary behavior in the city of New Delhi to show that children aged 8 to 15 years accumulated less than 1 hour/day of screen time.¹¹ Similarly, a Gulati et al study in 7 major Indian cities 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.⁵ After reviewing the available data sources, a grade of *C* was assigned as it appears that roughly half of children and youth are meeting sedentary behavior guidelines.

Family and Peers: *INC*

Family and peers play an important role in facilitating PA among children and youth. This indicator assesses parental facilitation of PA and sport opportunities (ie, driving to programming, registering children for activities), parents meeting activity guidelines for adults, and overall support offered to children and youth to enable the achievement of PA guidelines. There were no credible data sources reporting the influence of family and peers, hence a grade could not be assigned.

School—Infrastructure, Policies and Programs: *INC*

School is a critical venue for the accumulation of PA as children and youth spend a substantial amount of their waking hours at school. This indicator refers to the implementation of active school policies, opportunities to be physically active at school, as well as access to necessary facilities and equipment to support PA.

The Total Physical Fitness Program, a state-wide, longitudinal initiative implemented in 91% of schools ($n = 6101$) in the southern Indian state of Kerala, is targeting children ($n = 2,334,739$ in 2009–2010) to improve their physical fitness.⁹ These unpublished data are not, however, nationally representative. Since 2010, the Central School Board for Secondary Education instituted a policy (Circular No. 71) requiring schools to provide opportunities for at least 40 to 45 minutes of PA during school hours for grades 1 to 10, and at least 2 periods (90–120 minutes/week) of PA/games/mass physical education training/yoga for grades 10 to 12.³⁰ However, this school board is not representative of all schools in India, and although there is some indication of other schools instituting similar curricula and policies,¹⁰ valid independently collected data would be needed to ascertain the school infrastructure, policies and programs.

Community and the Built Environment: *INC*

Community and the built environment plays a major role in enabling or restricting opportunities for PA. This indicator captures community's perception of environment as it relates to PA of children and youth, infrastructure (eg, sidewalks, bike trails), as well as availability of playgrounds and parks for outdoor play. Some evidence is provided by Larouche et al, where a major Indian city, Bangaluru, was perceived to be relatively safe, walkable, and comprised of diverse destinations.¹⁷ However, Bangaluru cannot be considered a representation of built environment across India, where there

is wide variation in features of built environment between cities, towns, and rural areas.³¹

The Clean Air Initiative for Asian Cities (2011) conducted a comprehensive study of walkability in 6 Indian cities (Bhubaneswar, Indore, Surat, Chennai, Pune, and Rajkot) using a variety of methods, including field surveys, pedestrian interviews ($n = 1900$), as well as policy and institutional assessments.³¹ The study included a combination of small and large cities, which together are representative of cities across India. The main findings showed that although walking environment varied significantly between locations, overall, Indian cities had low walkability ratings due to poor and unsafe infrastructure, as well as lack of appropriate sidewalks. Areas with large numbers of pedestrians (ie, public transport terminals) received lower ratings than residential areas. A key determinant of walkability that is often not measured in Western countries is air pollution, which pedestrians identified as a barrier for walkability. The policy and institutional assessments revealed that there is a lack of relevant policies, institutions, and political support for pedestrian needs.³¹ While there is a clear indication of poor walkability in Indian cities, current data are insufficient to assess all the parameters required to grade this indicator.

Government—Strategies, Policies, and Investments: *D*

Government strategies, policies, and investments are instrumental in enabling access and minimizing active living inequities across populations. The government of India has issued several broad strategy and policy documents, outlining the importance of PA, as well as PA guidelines.^{32,33} However, there is no clear indication of these strategies being implemented. The majority of government-led strategies are focused on competitive sport and the development of elite national and international athletes.^{21–23} There is no readily available evidence of strategies and investments that are being directed toward children and youth, with the exception of the Total Physical Fitness Program being administered by the state government of Kerala.⁹ As indicated in the Community and Built Environment section, active living urban planning policies to improve walkability are also lacking.³¹ In terms of school strategies and investments, a policy is in place to mandate compulsory PA in schools regulated by the Central Board of Secondary Education, an autonomous organization under the Union Ministry of Human Resource Development, Government of India. However, again, there is lack of evidence of actual implementation of these school-based policies.³⁰ Overall, evidence indicates a dearth of strategies or investments to facilitate PA among children and youth, hence a grade of *D* was assigned.

Physical Fitness: *INC*

Many schools across India employ measures of physical fitness using a variety of tests and exercise regimens. The Total Physical Fitness Program from Kerala schools,⁹ as well as programming provided by private organizations,²⁰ indicates that overall physical fitness among children is poor. In Kerala, approximately 15% of children were classified as physically fit and they demonstrated a modest improvement (1.5%) after 1 year of the fitness program implementation. Data from one private organization that provides physical activity programming in schools indicated that 1 in 5 children ($n = 148,054$) did not have adequate 'endurance capability' and 1 in 4 did not have 'desired flexibility'.²⁰ However, independent and

valid nationally representative data need to be collected to ascertain a grade for the indicator of Physical Fitness.

Strengths and Limitations

The Canadian and Indian research collaboration is the major strength of this study, which resulted in an interdisciplinary team of international experts. The host organization, Johnson Shoyama Graduate School of Public Policy, is known for providing policy leadership and knowledge dissemination guidance. The cohost, Public Health Foundation of India, has a vision to provide knowledge via research and policy development to achieve better health outcomes for all Indians. Thus a partnership between these 2 institutions enables a strong foundation to maximize the impact of the report card. In addition, the RWG's access to large rural data provided more credibility to the assessment of key indicators.

Nevertheless, the main limitation is the dearth of comprehensive national surveys and minimal regional active living research, which resulted in the absence of assessment of a number of indicators. It is also important to note that with India's vast and diverse population being spread across cities and rural areas of varying sizes,^{34,35} the data sources appraised for this report card do not provide a comprehensive representation of India's diversity. Thus the grades assigned depict average scores based on appropriate weightage of available data.

Conclusion

It appears that most Indian children do not achieve recommended levels of PA and spend most of their day in sedentary pursuits. Although there is indication of some state-level and private organizational efforts to promote PA, there is a clear lack of evidence demonstrating implementation of government strategies to drive child and youth-focused active living policies and programs. Moreover, nationally representative evidence is needed to grade all the relevant report card indicators. India's 2016 Report Card ultimately highlights the need for more active living research to inform strategies and investments that will facilitate PA in children and youth.

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