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32

Abstract

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Background The Report Card on Physical Activity for Children and Youth aims to consolidate existing evidence, encourage more evidence-informed physical activity, and improve surveillance of physical activity.

Methods Application of Canada and Scotland Report Card methodology to Japan, adapted to Japanese circumstances and availability of data, and based on nationally representative surveys.

Results The 2016 Japan Report Card on Physical Activity for Children and Youth consists of Health Behaviors and Outcomes (7 indicators); and Influences on Health Behaviors (4 indicators). Three Health Behaviors and Outcomes received C grades (Participation in Sport; Sedentary Behavior; Recreational Screen Time; Physical Fitness), while two indicators could not be graded (Overall Physical Activity, and Active Play). The indicators Active Transportation (B) and Weight Status were favorable (A). In the Influences domain, Family Influence and Community and the Built Environment were graded as D, while the School & Childcare Settings and the Government Strategies and Investments were favorable (B).

Conclusions The Japan report card illustrated some favorable health behaviors, health outcomes, and influences. There is a need for more evidence especially on overall physical activity, active play, and community and the built environment.

Key words: sports; sedentary behavior; environment; policy; physical fitness

Introduction

Public health surveillance of physical fitness in children and youth in Japan using school-measures of physical fitness has been based on the Physical fitness test of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) since 1964, when the 18th Summer Olympic Games was held in Tokyo.¹ This surveillance is performed to evaluate the physical fitness and exercise, life and eating habits across the life course, from Japanese children to the elderly, every year. In 2013 the MEXT issued a report comparing physical fitness in children and adolescents from 1964 to 2013.¹ The results indicated that physical fitness and motor skill levels (Grip Strength, 50 Meter Run, Standing Long Jump, Softball Throw, Side Step, and Step Test or 20 Meter Shuttle Run) obtained in 2014 were lower than that at time of the previous Olympic Games. It was notable that, there has been a polarization in exercise habits in recent children and adolescents.² The latest surveillance of the Japan Sports Agency in 2015 reported that students with high exercise habits or exercise duration per week had superior physical fitness, liked exercise, participated in, watched or talked about sports or exercise with a guardian, and understood the importance of sleeping and eating habits.³ While there are several national representative surveys of exercise habits and related information on Japanese children and adolescents, they are somewhat limited. Thus, further comprehensive surveys should be performed.

The Report Cards on Physical Activity for Children and Youth from Canada and 14 other countries published in 2014 presented a promising approach to achieving a more robust physical activity surveillance and evidence-informed physical activity promotion strategy in Japan.⁴⁻⁷ Japan is going to host the Tokyo 2020 Olympic and Paralympic Games. The Japan report card has the possibility of showing any sporting legacy created by the Games, and may have a lasting

75 impact on the country and its residents not only children and adolescents in the near future. The
76 purpose of this paper is to summarize the process and results of the 2016 Japan Report Card on
77 Physical Activity for Children and Youth. This report card is based on recent nationally
78 representative surveys of Japanese children and youth.

79 **Methods**

80 The 2016 Japan Report Card on Physical Activity for Children and Youth was produced by
81 a small Research Work Group, based on the Canadian and Scottish models^{4,5,7} which consisted
82 of the six authors of the current paper. Members of the Stakeholder Group helped identify
83 relevant data for the Japanese card. Funding for the 2016 Japan Report Card on Physical Activity
84 for Children and Youth was provided by a grant from the project research of Japanese Society of
85 Physical Fitness and Sports Medicine in 2015 (2015~2017)
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87 Health and Sports Science & Medicine, Juntendo University. The funding body had no role in
88 the content or presentation of the report card, and no role in the current manuscript.

89 Since the 2016 Japan Report Card on Physical Activity for Children and Youth was
90 modelled closely on the Canada and Scotland Report Cards, it was our intention to harmonize
91 indicators (health behaviors and influences) with those Report Cards as much as possible, subject
92 to the availability of suitable Japanese data. However, Japanese public health surveillance data
93 were available for some health outcomes not included in the other countries cards, but which are
94 related to physical activity, and hence we included these indicators in the Japanese report card,
95 notably physical fitness and weight status. The final Japan Report Card therefore had a total of
96 11 indicators (Table 1).

97 From July 2015 to February 2016 the Research Work Group searched for relevant evidence
98 from nationally representative surveys within Japan. Like the Active Healthy Kids Scotland
99 Report Card, restricting the search to national surveys seems appropriate because several
100 nationally representative surveys exist within Japan, and because of the dearth of large nationally
101 representative research studies with high quality measures of the health behaviors and outcomes
102 of interest. For the 11 indicators draft grades were assigned by the Research Work Group in
103 February 2016, by comparison of the national survey data against a relevant evidence-based
104 recommendation (e.g. two hours/day recreational screen time for school-age children and
105 adolescents) where available, using the benchmark approach from the Canada and Scotland
106 Report Card.^{4,5,7} The grades used were as follows: grade A (we are succeeding with >80% of
107 children and adolescents); grade B (succeeding with 60-79%); grade C (succeeding with 40-
108 59%); grade D (succeeding with 20-39%); grade F (succeeding with <20%). The report card
109 process, and the current manuscript also considered how each report card indicator measure
110 might be improved in future (e.g. by inclusion of a better measure of that indicator); and a brief
111 consideration of how the grade might be improved in the future. Decisions of this kind were
112 made by the Research Work Group, using a combination of their expertise in the area, and the
113 consultation process with stakeholders in Japan.

114 Draft report card grades were considered at a feedback meeting attended by the Research
115 Work Group, and the Stakeholder Group who were members of Japan Society of Human Growth
116 and Development (<http://www.hatsuhatsu.com/english/>), in March 2016. In the consultation
117 stakeholders were asked to address the following questions: were any relevant Japanese data
118 missed in the process of card development?; were any data misinterpreted by the Research Work
119 Group? (e.g. were the draft grades justified?). This consultation process informed the final grades

120 in the short form report card published in May 2016. The long form (more detailed report card,
121 with further information on data considered and rationale for the grades) will be published in
122 October 2016.

123 **Results**

124 The 2016 Japan Report Card on Physical Activity for Children and Youth is summarised in
125 Table 1. The short-form and long-form Japanese report cards are accessible from the project
126 website www.activekids.jp.

127 For the category of ‘Health Behaviors and Outcomes’ (Table 1), 5 of the 7 indicators could
128 be graded with a degree of confidence with a combination of the availability of a
129 recommendation and the benchmark of the proportion of children and youth meeting the
130 guideline as noted above or the percentage of each indicator. The indicator ‘Overall Physical
131 Activity’ could not be graded, because evidence-based data for the behavior were lacking in
132 Japan. Table 1 shows that the key health behaviors and outcomes were generally assigned middle
133 grades: C for Organized Sport Participation; C for Sedentary Behavior (recreational screen time);
134 C for Physical Fitness, in particular. On the other hand, Weight Status and ‘Active
135 Transportation’ were favorable (A and B grades respectively). For the category of ‘Influences on
136 Physical Activity and Health Behaviors and Outcomes’ grade assignment was possible with a
137 degree of confidence, but the indicator ‘Active Play’ could not be graded due to lack of evidence
138 (Table 1). The indicator ‘Family and Peer Influence on Physical Activity Behaviors and
139 Outcomes’ was graded D, informed by adult data that show Japan is characterised by low
140 participation rate in organized sports among adults, and low participation in sport and physical
141 activity of parents with their children; adherence to physical activity recommendations among
142 adults is modest-low. The indicators ‘School’ and ‘Government Strategies and Investments’

143 referred to national policy, and were graded B on the grounds that Japan has some a favorable
144 national government school curriculum, policies, strategies, and investments which target most
145 of the seven health behaviors and outcomes included in the report card. However, the indicator
146 ‘Community and the Built Environment’ was graded D because many prefectures lack adequate
147 facilities, programs, parks & playgrounds for exercise, and surveys of parents suggest that safety
148 concerns in their neighborhood reflect a perception of low child safety for outdoor active play,
149 exercise or sports in preschool and primary school children. Moreover, there is little evidence on
150 this indicator for school-aged children to help determine the grade.

151 **Discussion**

152 The cover of the Active Healthy Kids Report Card Japan 2016 shows students engaging in
153 both physical activity and sedentary behaviour during a physical education (PE) class. The
154 Japanese government sets national educational curriculum guidelines for PE classes in school
155 aged students, and guidelines for active play in preschool children. All Japanese school aged
156 students attend PE class about twice a week in the school term (almost 100 classes/year) and
157 learn many sports skills and rules included in martial arts which are Japanese traditional sports
158 (e.g.. Kendo, Judo).⁸ A stated aim of these government guidelines is to improve physical fitness
159 and to promote a positive attitude toward exercise as a lifelong physical activity. However, as the
160 cover of the Japan 2016 Report Card suggests students don’t move continuously during PE class,
161 because they have to sit during their teacher’s instruction and/or while waiting their turn. It is
162 also worth noting that a recent systematic review of the moderate-vigorous physical activity
163 (MVPA) content of school PE globally suggested that a minority of time in PE classes was spent
164 in MVPA.⁹

165 Overall physical activity levels

166 We have assigned INC for a grade of overall physical activity levels. There are no
167 representative Japanese data for physical activity in under 15-year-olds, a major limitation of
168 Japanese surveillance data. The National Health and Nutrition Examination Survey reported step
169 counts for 15-19 year olds.¹⁰ In males, the data showed a marked decrease over the past few
170 years in 2010, mean values of 7458 steps/day for girls, 7872 steps/day for boys. On the other
171 hand, trend data in females generally continues to be flat, with no obvious recent secular trends.
172 However, step count data haven't been reported by the National Health and Nutrition
173 Examination Survey since 2012. An additional problem is that in Japan an official national
174 physical activity guideline does not exist for adolescents. The Japan Sports Association guideline
175 (Active Child 60min) for preschool and primary school children is based on international
176 physical activity guidelines. Similarly, for preschool children, the official national physical
177 activity guideline was proposed by MEXT (2012). They address only duration not intensity.

178 Some relevant regional (not nationally representative) physical activity data are available
179 within Japan. The Tokyo Metropolitan Board and Education Survey collected pedometer data
180 for 6-17 year olds in Tokyo in 2012 and found that only a small percentage of 11-15 year old youth
181 met the adult recommendation of at least 10000 step counts per day.¹¹ Development of the Japan
182 2016 Report Card has also confirmed that there are currently no objectively or subjectively
183 measured Japanese daily physical activity surveillance data for younger children, a major gap in
184 public health surveillance in Japan.

185 Organized sport participation

186 Two data sources were used to consider organised sport participation among Japanese
187 children and adolescents: the first is the results of national physical fitness survey is reported by
188 the Japan Sports Agency in 2015.³ This survey collected questionnaire data from a nationally

189 representative sample of 47 prefectures for 6-17 year-olds. The Sasagawa sports foundation
190 (SSF) carries out a survey of exercise and sports participation among children every other year.¹²
191 The survey uses a stratified two-step random sampling method. This survey currently includes
192 only the small number of participants in each age group, and so is currently a less useful source
193 for surveillance of organized sport participation than the national physical fitness survey by the
194 Japan Sports Agency.

195 The Japanese government does not currently issue recommendations for organized sport
196 participation in children and adolescents. The grade for this indicator was based on self-reported
197 participation in sport. Participation in sport was reported by 27~92% of 6-to 17-year-olds by the
198 national physical fitness survey of Japan Sports Agency.³ There were age and gender differences
199 in participation in organized sports, with lower participation among younger children than older
200 children and adolescents, and lower participation among girls than boys (4-5 years old; 27.7% in
201 girls, 30.1% in boys, 6-11 years old; 44.0% and 61.8%, 12-14 years old; 68.7% and 90.1%, 15-17
202 years old; 45.7% and 70.2%). Surveillance in Japan therefore suggests that strategies to increase
203 the percentage of young children and girl's participation in organized sports will be necessary in
204 the future.

205 Active Play

206 The present study found no representative Japanese data for active and outdoor play. In
207 addition, there are no Japanese government recommendations for active and outdoor play. Thus,
208 the grade INC. Future surveillance of active and outdoor play in Japan should be considered, and
209 this domain of physical activity might be a neglected but potentially useful target of future
210 strategies aimed at increasing physical activity. Janssen suggested that an importance of active
211 play in reducing childhood obesity.¹³ The Japanese national physical activity guideline in

212 preschool children also focuses on active play. However, Tanaka et al. suggested that in
213 preschool children participation in a sports club and time in walking to school were not
214 correlated with MVPA when adjusted for age, body height and log-body weight.¹⁴ Moreover,
215 parents' reported outdoor playing time was not significantly correlated with daily MVPA in
216 preschool children.¹⁴

217 Active Transportation

218 The SSF database was used to estimate prevalence of active transportation to school for the
219 purposes of grading for this first Japanese report card, as it provided recent and nationally
220 representative data.¹² The SSF carries out an investigation to clarify the present state of active
221 transportation for children and adolescents every other year. There are no Japanese government
222 recommendations for active transportation and the grade was assigned according to the
223 percentage of children who regularly commute actively to school (walking or cycling). The 2015
224 SSF National Sports-Life Survey of Children reported that 28% of Japanese preschool children
225 (4-5 year olds) regularly commute actively (walking) to school.¹² The 2015 SSF National Sports-
226 Life Survey of Young People reported that 93% of Japanese elementary school children (6-11
227 year olds) regularly commute actively (walking or cycling) to school, and 88% of those at junior
228 high school (12-14 year olds) and or 68% of high school students (15-18 year olds) regularly
229 commute actively to school.¹² The grade for Active Transportation is B, and is substantially
230 higher than for most of the other high-income countries reported by the international Active
231 Healthy Kids Report Card in 2015.⁶

232 Sedentary Behavior

233 We used both the national physical fitness survey of Japan Sports Agency (2015) and the
234 SSF Survey (2015) as sources of evidence for grading of sedentary behaviour indicator.^{3,11} In

235 other countries, sedentary behavior guidelines are usually presented separately from physical
236 activity guidelines,¹⁶⁻¹⁸ and there is an international consensus that school-age children and
237 adolescents should spend no more than 2 hours per day in recreational screen time. There are
238 currently no Japanese government recommendations for sedentary behavior. Thus, the grade for
239 the first Japanese report card was assigned with reference to the international guidelines.
240 Sedentary behaviour was graded C based on somewhat limited recreational screen-time data.
241 Moreover, no data were available for objective measures of sedentary behavior, or for types of
242 sedentary behavior other than recreational screen time, including constructs of sedentary
243 behavior now considered very important to later health, notably time spent sitting and breaks in
244 sitting time.¹⁹

245 Physical fitness

246 We used the database by the national physical fitness survey of Japan Sports Agency (2015)
247 to grade this indicator. There are no Japanese government recommendations for Physical fitness.
248 However, the Japan Sports Agency (2015) comprehensively evaluates physical fitness and motor
249 skills test (grip strength, sit-ups, sit & reach, side step, 20meter shuttle run: elective choice
250 between 20 Meter Shuttle Run and endurance run in 12 to 19 year-old students, 50 meter run,
251 standing long jump, and softball throw in 6 to 11 year-old students or handball throw in 12 to 19
252 year-old students) by 5 gender- and age-specific ranks (A~E).³ The percentage of A and B ranks
253 among Japanese 6- to 17-year-olds was 42-67%. Thus, the grade for Physical fitness in the first
254 Japanese report card was C. The physical fitness test data suggest that currently physical fitness
255 level in children and adolescents is lower than that in the 1980s.¹

256 There are currently no nationally representative data on physical fitness for younger
257 children, under the age of 6 years. For the present study Physical fitness and motor skills was

258 difficult to grade, because it concerns a health outcome rather than health behaviors, and so does
259 not fit very easily into the A-F grading scheme described above.

260 Weight status

261 We used the database of the School Health Survey data (2015) of the MEXT to grade this
262 indicator.²⁰ The survey uses a two step stratified random sampling method and is assumed to
263 produce representative data. The Survey reported that 2.24-11.34% of 5-17 years old Japanese
264 boys and girls were obese. The grade for this indicator was A. Obesity was defined as over 20%
265 of standard weight which is gender- and age-specific. Although obesity levels decreased from
266 2006, they have been stable since 2011. Overall, however, levels are high compared the 1980s.
267 On the other hand, the percentage of underweight is 0.40-4.33%. The underweight data
268 maintains an upward trend in both genders. As a health outcome rather than a health behavior,
269 like physical fitness as noted above, weight status was also difficult to grade.

270 Family and Peer Influence

271 We used three data sources when grading this indicator, the annual nationwide National
272 Health and Nutrition Survey conducted by the Ministry of Health, Labour and Welfare²⁰, the
273 Survey of SSF (2015)¹², and the report by Health Japan 21 (second term) of Ministry of Health
274 Labour and Welfare.²¹ In all cases the data sources were effectively proxies for Family Influence,
275 and provided little direct evidence on the influence which parents of peers have on physical
276 activity among children and adolescents in Japan. The Japanese government does not currently
277 issue recommendations for exercise or sport with their parents in children and adolescents.
278 Moreover, there are no representative Japanese Peer-Influence data. We considered that data on
279 adult physical activity levels and exercise or sport with their parents in children and adolescents

280 would be appropriate as proxies for family influence in the absence of more direct data, as is the
281 case in many other countries which have produced Report Cards to data (e.g. in Scotland).⁷

282 The original the National Health and Nutrition Survey was conducted in 1946. A total of 3648
283 households participated in the survey²⁰ of survey.²⁰ The SSF database was used to estimate
284 participation in exercise or sport of Japanese preschool children (4-5 years old) with their
285 parents.¹² Health Japan 21 (second term) is a national policy which focuses on extending healthy
286 life expectancy, and minimizing the spread in health inequalities within the population.²¹ The
287 National Health and Nutrition Survey in 2014 reported that daily step counts were 6794
288 steps/day for women aged 20 to 64years old, and 7860 steps/day for men, respectively.²¹ These
289 results fail to meet the target of Japan 21 (second term) which are 8,500 steps/day for women and
290 9,000 steps/day for men. The physical activity surveillance data self-reported for adults in Japan
291 shows that about one third of Japanese adults participate in sport more than 30min at least twice
292 per week for more than 1year.^{20, 21} These data fall below the target of participation in sport as set
293 by Health Japan 21 (second term).²¹ Surveillance data for adult obesity defined as BMI (body
294 mass index) over 25 kg/m² suggest that adult obesity in 2014 was quite common at 31% of men
295 and 25% of women. There are some limited Japanese data which are relevant to family/peer
296 influence: in fifth grade Japanese primary school students and for those in second year in junior
297 high school, the reported percentage of participation in sport or exercise with a guardian more
298 than once per week ranged from 7-36% in the national physical fitness survey P of Japan Sports
299 Agency (2015).³ The 2015 SSF National Sports-Life Survey of Young People reported that 72%
300 of Japanese preschool children (4-5 years old) participated in exercise or sport with their parent
301 “often” or “sometimes”.¹² Grading of these limited influence data was difficult, but combined

302 with the evidence of fairly low-moderate adult physical activity and relatively high prevalence of
303 adult obesity the grade for Family and Peer Influence was D.

304 School

305 Sources of evidence for grading of this indicator were the national educational curriculum,
306 and school infrastructure and equipment guidelines for PE in school aged children and
307 adolescence or active play in preschool children. The grade was assigned based on the
308 curriculum content and presence of infrastructure and equipment such as environment in school
309 e.g. safety; healthy cultural environment (e.g. a lot of sunshine and fresh air), neighborhood and
310 school route, school building, indoor or outdoor exercise facilities in preschool to high school.

311 The MEXT sets the curriculum in elementary school, junior high school and high school
312 including the content of PE and the number of PE classes provided. The curriculum for
313 kindergarten is also set by the MEXT. The curriculum for nursery schools is set by the Ministry
314 of Health, Labour and Welfare. Both guidelines require physical activity during childcare for
315 young children. However, PE in primary schools or active play in nursery schools or
316 kindergarten isn't carried out by specialized course teachers who have studied PE. Also, in
317 primary schools, only PE classes don't use textbooks. The MEXT produces guidelines for school
318 infrastructure and equipment for PE or active play in kindergartens, primary schools, junior high
319 schools, and high schools such as the area of the school playground, the existence of a
320 gymnasium and relevant equipment according to the education guidelines, for example, sports
321 mat, horizontal bars, hurdles etc. The nursery school facilities are also set by the same ministry.
322 With a number of relevant guidelines for school and preschool settings, the grade for school and
323 childcare settings was B.

324 Community and the Built Environment

325 The Health Japan 21 (second term) policy by the Ministry of Health, Labour and Welfare and
326 the database of the SSF (2015) were used to grade this indicator.^{12,21} The grade was assigned by
327 the perceived availability of environments for exercise or outdoor play. Health Japan 21 (second
328 term) reported that the number of local governments which were trying to provide environments
329 where residents can easily access for exercise stood at 17 of the 47 prefectures (in 2012).²¹ The
330 2015 SSF National Sports-Life Survey of Young People reported that 48.2% of Japanese parents
331 of 4-9 year old children agreed they lived in neighborhoods that allowed children to engage in
332 active and outdoor play, exercise, or to participate in organized sports.¹² Thus, with evidence of
333 modest accessibility to outdoor space to be physically active the grade for community and the
334 built environment was D.

335 Government Strategies and Investments

336 In order to grade this indicator we searched for relevant national laws, ordinances,
337 strategies, and policies in Japan. In Japan, there are many relevant laws and ordinances: The
338 Basic Act on Sport, Health Promotion Law, the School Lunch Program Act, the Community
339 Health Act, the Maternal and Child Health Act, the School Health and the Safety Act, Basic Act
340 on Food Education. There are also multiple relevant strategies and policies like The Sport Basic
341 Plan, Health Japan 21 (second term), Healthy parents and children 21 (second term). However,
342 Physical activity guidelines for Japan at present are only available for preschool children,
343 primary school children, adults, and the elderly: as noted above there are no national physical
344 activity guidelines for adolescents, and this may have limited surveillance of physical activity
345 and in turn policy, limited the strategy and investment for physical activity for school-age
346 adolescents. Investment and implementation of national policy is the responsibility of the
347 Japanese national budget for sports and the Sports Promotion Lottery, called “toto”: this is used

348 as a subsidy for sport. Despite some limitations in the evidence available for this indicator, the
349 presence of multiple policies and strategies, with some evidence of implementation of policy,
350 meant that, the grade for national policy, strategy, and investment was B.

351 **Strengths and Limitations**

352 Although grades assigned in the Japan 2016 Report Card on Physical Activity for Children
353 and Youth were based on the best available data, and on recent nationally representative surveys,
354 the process of developing the Japanese Report Card highlighted a number of gaps in Japanese
355 surveillance of health behaviors and outcomes. The three most glaring gaps were the lack of
356 surveillance of physical activity, active play, and the absence of objective measures of sedentary
357 behavior. For some indicators in the ‘Health Behavior and Outcomes’ category there were no or
358 limited data for school-aged children. For other indicators difficulty in assigning a grade arose
359 from a combination of limitations in the surveillance data and the absence of an evidence-based
360 recommendation against which to assess adherence.

361 **Conclusions**

362 The first 2016 Japan Report Card on Physical Activity for Children and Youth shows that
363 Japanese children and adolescents have moderate levels of organized sport participation and
364 recreational screen time and they develop in an adult environment with low organized sport
365 participation, moderate levels of physical activity, and relatively high prevalence of adult
366 obesity. However, this first Japanese card suggests that Active Transportation to School in Japan
367 is very high by international standards and environmental factors (School and Government
368 strategies and investments) believed to influence physical activity are favorable.⁶ Future
369 nationally representative surveys on overall physical activity, active play and, community and
370 the built environment are needed. A combination of surveillance data for physical activity in

371 future, combined with future issues of the Japanese report card, will be useful in assessing
372 whether the generally favorable policy environment in Japan is having the desired impact on
373 physical activity and other important health behaviors and health outcomes included in the report
374 card.

375

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454

455 **Tables**

456

457 Table 1. Grades According to Physical Activity Indicator in the 2016 Japan Report Card on
 458 Physical Activity for Children and Youth

Indicator	Grades
Overall Physical Activity Levels	INC
Organized Sport Participation	C
Active Play	INC
Active Transportation	B
Sedentary Behaviours	C
Physical fitness	C
Weight status	A
Family and Peer Influence	D
School	B
Community and the Built Environment	D
Government strategies and investments	B

459

460 *Note.* The grade for each indicator is based on the percentage of children and youth meeting a
 461 defined benchmark: *A* is 81% to 100%; *B* is 61% to 80%; *C* is 41% to 60%, *D* is 21% to 40%; *F*
 462 is 0% to 20%; *INC* is Incomplete data.

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Figures

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468 Figure 1: Front Cover of the 2016 Japan Physical Activity Report Card

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470 **Blank: We are going to submit that by July.**