

1 **The pilot study for health check-ups system at elementary school in Cambodia**

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3 Channarena CHUON<sup>1</sup>, Somana SVAY<sup>2</sup>, Olline LIM<sup>3</sup>, Shintaro NAGASHIMA<sup>1</sup>, Chikako  
4 YAMAMOTO<sup>1</sup>, Ko KO<sup>1</sup>, Hiroko FUJII<sup>1</sup>, Masayuki OHISA<sup>1</sup>, Tomoyuki AKITA<sup>1</sup>, Noboru GOTO<sup>5,6</sup>,  
5 Mayumi FUJIMOTO<sup>1</sup>, Aya SUGIYAMA<sup>1</sup>, Keiko KATAYAMA<sup>1</sup>, Tomoki SATO<sup>4</sup>, Junko TANAKA<sup>1</sup>  
6

7 <sup>1</sup>Department of Epidemiology, Infectious Disease Control and Prevention, Graduate School of  
8 Biomedical and Health Sciences, Hiroshima 734-8551, Japan

9 <sup>2</sup>University of Health Sciences, Phnom Penh, Cambodia

10 <sup>3</sup>Ministry of Health, Phnom Penh, Cambodia

11 <sup>4</sup>Hiroshima City Funairi Citizens Hospital, Hiroshima 730-0844, Japan

12 <sup>5</sup>Department of Management Studies, Graduate School of Social Sciences, Hiroshima University,  
13 Hiroshima 730-0053, Japan.

14 <sup>6</sup>NGO Hiroshima, Hiroshima 720-0812, Japan

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20 **Corresponding author:** Junko Tanaka, Prof, Ph.D.

21 Department of Epidemiology, Infectious Disease Control and Prevention,  
22 Graduate School of Biomedical and Health Sciences, Hiroshima University

23 1-2-3 Kasumi, Minami-ku, Hiroshima 734-8551, Japan

24 Tel: +82-81-257-5160; fax: +81-82-257-5164

25 E-mail: jun-tanaka@hiroshima-u.ac.jp  
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28        **Abstract (220words)**

29        **Background:** In Cambodia, a national health check-ups system has not existed yet in schoolchildren and  
30        general population. This is a pilot study aimed to promote school health check-ups system to Cambodia  
31        collaborating with government of Cambodia.

32        **Method:** From 2016 to 2017, we conducted a survey in the elementary school in Siem Reap province,  
33        Cambodia, 292 students were eligible for data analysis. Physical examination, questionnaire and  
34        urinalysis were conducted using Japanese school health check-ups model. Anthropometry was measured  
35        using WHO Growth Reference for school-age children.

36        **Results:** Among 292 schoolchildren, 88.7% students were diagnosed as healthy. Two (0.7%) students  
37        with rale, 1 (0.3%) student with abnormal urinalysis and another 27 students with complaining  
38        cardiopulmonary symptoms in questionnaire were recommended to go to hospital. The prevalence of  
39        overweight (15.1%) was higher than underweight (8.6%). According to answers by parents, coverage  
40        rate of National Immunization Program was varied from 41.8% to 79.8% depending on the type of  
41        vaccine.

42        **Conclusion:** In this pilot study, we showed the prevalence of healthy among schoolchildren of Cambodia  
43        and detected the students with possibility of health problem through this screening and recommended for  
44        visit hospital. Base on the results, we assume that health check-ups system in elementary school in  
45        nationwide will be effective in assessing the current health status in ordinary time and possibility of early  
46        detection of disease.

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48

49 **INTRODUCTION**

50 School Health check-ups is a part of the school health services of the World Health Organization's  
51 Health Promoting Schools (HPS) framework. The HPS was launched in 1995 by the World Health  
52 Organization (WHO) to help raising school health and to prevent from diseases widespread during  
53 school life and to attain education as well as improvement of health in the community through the school.  
54 WHO has joined together with several specialized agencies from United Nation (UN) to develop a  
55 framework called Focusing Resources on Effective School Health (FRESH). This framework outline  
56 contributes to improve health in children at school and community association with Sustainable  
57 Development Goals by 2030 (SDGs). The results of large number of the research on the school health  
58 were introduced worldwide to help engagement of school health and background of public health issues  
59 in each country<sup>27,28,34,35</sup>.

60 Cambodia has become a middle-income country from low-income countries due to recent economic  
61 development. Among the total of 16 million population, more than 2 million children enrolled in the  
62 primary schools in 2016<sup>31,32</sup>. Therefore, the Ministry of Health (MoH) and Ministry of Education, Youth  
63 and Sport (MoEYS) has joined together for establishment a school health policy and a national plan to  
64 promote health in the school and to increase welfare in children and women as well as vulnerable persons  
65 in Cambodia<sup>19</sup>). In spite of these national strategic plans of the Cambodia government to promote  
66 children health in school, few studies have been reported on children health<sup>4,9,10,11,24,26</sup>). Up to now, there  
67 is no published data on health check-up in Cambodia. Therefore, Ministry of Health in Cambodia  
68 collaborated with this pilot study to examine the health check-ups system at elementary school in  
69 Cambodia. In Japan, since the Meiji Era, the school health programmes launched in response to epidemic  
70 of infectious diseases, engagement of nutritional and growth development in children. The outcomes of  
71 the school health programmes has enormously contributed to the development of today's Japanese  
72 society<sup>12</sup>). In Japan, database of the school health check-ups has also been useful at the time of disaster  
73 or emergency as a reference data. Therefore, the purposes of this study are to investigate the current  
74 health status of the children using Japanese school health check-ups model and propose the  
75 recommendations to establish effective elementary school health check-up system in Cambodia.

76  
77 **MATERIALS AND METHODS**

78 **Study design and subjects**

79 This pilot study was conducted among students at graders 3 and 4 (academic year 2015-2016), 3 and 6  
80 (academic year 2016-2017) at Teacher Training elementary school in Siem Reap province, Cambodia  
81 in June 2016 and August 2017. This school was selected based on the recommendation of a local  
82 government because this school is mainly supported by MoEYS for training teachers throughout  
83 northeast region of Cambodia and representative for high-level of national school in making school  
84 education and school health policy. This study performed by researchers and medical doctors from  
85 Hiroshima University including a pediatrician, in cooperation with the Ministry of Health in Cambodia,  
86 Provincial Teacher Training Colleague of Siem Reap province, Siem Reap Provincial Referral Hospital  
87 and University of Health Sciences in Cambodia. This study consisted of physical examination,  
88 questionnaire and urinalysis. Totally, 349 students were asked to participate in our study and 294  
89 students agreed to participate in the study after written consent of each legal guardian due to 55 students  
90 were absent and did not submit consent form. Two of 294 students were excluded because questionnaire  
91 and physical examination were missed. Totally 292 students, 135 in 2016 and 157 in the 2017, were  
92 analyzed [Fig.1]. The questionnaire and a sterile urine collection were distributed on the day of  
93 explanation that it was one or two days before the physical examination. We asked permission from the  
94 local authorities such school principals, duty officers of Ministry of Health of Phnom Penh and Siem  
95 Reap, and staffs of University of Health Sciences of Phnom Penh prior for conducting this survey. We  
96 also asked the school principals to notify at least one week ahead to students and their parents or  
97 guardians to attend the explanation at school. The local authorities were invited to attend our explanation  
98 and the day of data collection at school together with students and their parents or guardians

99

100 **Ethical consideration**

101 This study was approved by the ethical committee for the epidemiology of Hiroshima University in  
102 Japan (Permission No.: E-224-1) and by the Ministry of Health, Cambodia (Permission No.: 0085  
103 NECHR). Consent form was obtained from the legal guardians before participating in the study.

104

105 **Measurements and procedures**

106 In 2015, we conducted a pilot study among 87 elementary school children in Siem Reap province and  
107 then we revised and expanded the questionnaire, physical examination and urinalysis according to the  
108 Manual on Japanese School Health Check-ups<sup>15</sup>). The physical examination was assessed for height and  
109 weight, Ear-Nose-Throat<sup>13</sup>), Lung and Heart by medical doctors from Hiroshima University at the school.  
110 Tonsillar hypertrophy was defined as  $\geq 3$  grading according to Brodsky's classification<sup>2</sup>). The health  
111 check-ups results were feedback to all students at the next day of the health examination. The healthy  
112 students were received a health certificate from our team via the school principals and the suspicion  
113 unhealthy students were recommended to go hospital for further examination based on the evaluation  
114 criteria in this study [Figure2]. The questionnaire included major 16 items such as 3 for current medical  
115 history of the child, 2 for past medical history, 8 for subjective symptoms, 1 for vaccination history and  
116 2 for family medical history. The questionnaire was translated from English to Khmer by translators  
117 under confirmation of the local authorities. The questionnaire filled by parents or legal guardians at  
118 home and then students returned it to school on the day of the physical examination. Among them, 290  
119 students were brought urine specimens to the school. The urine specimens were screened for hematuria,  
120 proteinuria and glycosuria using urine dipstick (Uropaper III, Eiken Chemical Co. LTD, Japan). We  
121 instructed students to urinate before going to bed (empty bladder at night) and then asked them to collect  
122 urine in the early morning on the day of physical examination. All urine samples were confirmed on the  
123 day of health check-ups by our research team whether each student collected urine in the early morning  
124 or not. And then all urine specimens brought to the Siem Reap province referral hospital for testing.

125

### 126 **Anthropometric measurements**

127 In Cambodia, children are generally enrolled in the elementary school from 6 years old or at least 70  
128 months old<sup>20</sup>). In this study, we were able to confirm month old of every students to the school enrollment  
129 list. We used the WHO guideline of growth reference for the 5-19-year age group, in which the growth  
130 chart was classified by Standard Deviation (SD) of BMI value. The reference value of SD is set different  
131 depending on month old<sup>8</sup>) and is classified as Overweight:  $>+1SD$  (equivalent to BMI 25 kg/m<sup>2</sup> at 5–19  
132 years), Obesity:  $>+2SD$  (equivalent to BMI 30 kg/m<sup>2</sup> at 5–19 years), Thinness:  $<-2SD$ , and Severe  
133 thinness:  $<-3SD$ . We measured height and weight in all children. Height was measured with a Seca

134 mobile stadiometer model 213 (gmbh&co.kg) and height was measured with TANITA digital weight  
135 scale. Body Mass Index divided by weight (kg)/height (m) squared.

136

### 137 **Statistical analysis**

138 All data were entry in Microsoft excel and Descriptive statistical was analyzed using JMP version 11  
139 (SAS Institute Inc., located at SAS Campus Drive, Cary, NC, USA 27513). Sample size (n) was  
140 calculated according to the formula:

$$141 \quad n = \frac{Z_{\frac{\alpha}{2}}^2 P(1 - P)}{d^2}$$

142  $Z_{\frac{\alpha}{2}}$  is equal confidence level at 95% (standard value at 1.96), P is estimated prevalence of unhealthy  
143 students from our pilot study in 2015 was under 20% and d is margin of error at 5% (d=0.05). Thus, a  
144 minimum of sample size (n) was estimated 259, however, a total of 294 were participated in this study,  
145 but 292 were eligible for the data analysis.

146

### 147 **RESULTS**

148 292 students (54.5% boy and 45.5% girl; with an average age of  $9.8 \pm 1.7$  years) were eligible for the  
149 data analysis in the study. The characteristic of the school children was shown in Table1. In general, the  
150 Cambodian children complete elementary school for 6 years, however, some students repeat same grade  
151 and take longer to graduate for elementary school or some children enroll school after 7 years old. For  
152 the reason, the subjects of this study included 13 years and over. The prevalence of overweight and  
153 underweight was 15.1% (44/292) and 8.6% (25/292), respectively (Table2). By questionnaire, legal  
154 guardians answered that 182 (62.3%) students were complained about their children having dental caries,  
155 weight stunt (24.7%: 72/292), history of sudden tachycardia (6.2%; 18/292), history of arrhythmia  
156 (2.1%; 6/292), syncope during exercise (1.0%; 3/292), chest pain during exercise (4.5%; 13/292),  
157 dyspnea on exertion (14.0%; 41/292) and dyspnea during walking (8.6%; 25/292) as shown in Figure3.  
158 The vaccination coverage based on parents report was 50.0% for Diphtheria, 47.3% for Pertussis, 60.6%  
159 for Tetanus, 62.0 for BCG, 41.8% for Hepatitis B, 66.4% for Polio and 79.8% for Measles [Fig.4].  
160 Table3 showed the results of the physical examination such as ENT, lung and heart. By otoscopy  
161 examination, rupture (2.1%; 6/292), bloody (2.1%; 6/292), effusion (1.4%; 4/292), inflammation (1.4%;

162 4/292) and discharge (0.3%; 1/292) were found. However, based on clinical diagnosis as otitis media of  
163 the Japan otological society guideline, 20 (6.9%) students were suspected to have otitis media. Moreover,  
164 2 (0.7%) students found with tonsillar hypertrophy grading 3. For another two (0.7%) students, rale was  
165 detected by auscultation. Urinalysis results showed that 7 (2.4%) students had proteinuria 1+ and 1  
166 (0.3%) student had hematuria 2+ with proteinuria 1+ (Table4).

167 In this study, out of 292 students who had a school health checkup including the questionnaire, physical  
168 examination and urinalysis, 38 (13.0%) were supposed to have possibility of health problem. Of them,  
169 10 (3.4%) had the checkup in 2016 and 28 (9.6%) had it in 2017. In 2016, we conducted face-to-face  
170 interviews with parents of students who diagnosed some abnormality prior to making a recommendation  
171 to the students for having a further examination at a hospital aiming to determine whether the parents  
172 well understand the meaning of the questionnaire. However, in 2017, face-to-face interviews were not  
173 done because of the improvement of translational level of the questionnaire and all the students with  
174 abnormal findings received a letter recommending them to have a further examination at a hospital.

175 In 2016, 7 out of 10 students' parents answered that their children had either history of sudden  
176 tachycardia and/or syncope during exercise but we did not detect any findings of physical examination  
177 for them. Another one student had tonsil hypertrophy grading 3 with daytime sleepy, one was  
178 auscultated with rale and one had abnormal urinalysis. Seven out of 10 parents were willing to receive  
179 a face-to-face interview, of which 4 parents answered that their child had syncope or tachycardia in the  
180 questionnaire but after the interview we diagnosed they were not sick. Another one parent whose child  
181 was detected tonsillar hypertrophy grading 3 explained that the child was very active, therefore we did  
182 not recommend the children for visits hospital. According to the interview with parent, the student with  
183 rale had history of hospitalization three months ago with breathing difficulty, so we recommended to  
184 keep being in treatment. For the student with abnormal urinalysis, the parent said the child did not have  
185 any particular medical history but we recommended further examination at hospital.

186 In 2017, out of 28 who diagnosed some abnormality, 18 had the history of sudden tachycardia and/or  
187 arrhythmia and/or syncope during exercise and/or chest pain during exercise, 9 had dyspnea on exertion  
188 and dyspnea during walking, but they had no abnormal physical findings. Another one had rale with  
189 fever. All the 28 students received a letter recommending them to have a further examination at a  
190 hospital.

191 Considering the results of the interview in 2016, totally 88.7% (259/292) students were diagnosed as  
192 healthy.

193

## 194 **DISCUSSION**

195 This is the study on the school health check-ups among elementary school children in Cambodia jointed  
196 with government of Cambodia and researchers from Japan.

197 We conducted school health check-ups including physical examination, questionnaire and urinalysis  
198 using Japanese school health check-ups model at the elementary school in Siem Reap province,  
199 Cambodia. In the previous studies in Cambodia, it was mainly reported that children trends to be more  
200 malnutrition than over-nutrition<sup>11,24</sup>). Ikeda et al. showed that the prevalence of stunting in children  
201 under five-year-old was 49.3% in 2000 decrease to 39.0% in 2010<sup>11</sup>). Perignon et al. showed that high  
202 prevalence of stunting and severe stunting was 40.0% (965/2443) and 10.9% in children aged 6 to 16-  
203 yearold, respectively<sup>24</sup>). All the above studies use the WHO guideline of growth reference to assess the  
204 nutrient status, same as this study. According to our findings, the prevalence of overweight (15.1%;  
205 44/292) was higher than underweight (8.6%; 25/292). In comparison with a study on seven countries in  
206 ASEAN included Cambodia, Pengpid et al. showed that the low prevalence of overweight was 3.7% in  
207 Cambodia in 2015, but it was higher in higher income countries such Malaysia and Thailand<sup>23</sup>). In  
208 Cambodia, the aging population and non-communicable diseases have come to be major public health  
209 concerns with regards to the socioeconomic is increasing year by year<sup>31,32</sup>). Our results suggested the  
210 possibility of change of nutritional status, life-style in home, the activity of school time or other factors  
211 among elementary school children in Cambodia, but selection bias should be considered because this  
212 study conducted only in a public school in urban area. On the other hand, 24.7% (72/292) of the parents  
213 reported that their children had weight stunt in our study. This result may suggest that the lack of  
214 awareness of the nutritional knowledge among parents or guardians. To promote physical activity and  
215 healthy eating in order to prevent obesity or lifestyle-related diseases will become necessary to the future  
216 children in Cambodia. In addition, health education not only for children but also for their parents are  
217 very important.

218 A total of 292 students participated in the study, 38 (13.0%) were supposed to have health problems  
219 based on the questionnaire, physical examination and urinalysis. Among them, 10 (3.4%) students and



220 28 (9.6%) students were in 2016 and in 2017, respectively. However, after a face-to-face interview in  
221 2016, 5 out of 10 students were diagnosed as healthy, therefore totally 88.7% (259/292) students were  
222 diagnosed as healthy. Among total 29 (9.9%) students who were recommended for further examination  
223 at hospital, 27 (9.2%) answered “Yes” for the following items in the questionnaire; history of dyspnea  
224 or tachycardia or arrhythmia or syncope or chest pain. As for the screening test for heart and lung, we  
225 conducted only for the questionnaire and physical examination in this study. However, school health  
226 check-ups for heart in Japan include not only the questionnaire and physical examination but also  
227 electrocardiogram<sup>14)</sup>. Japan is the only country conducting the nationwide heart disease screenings for  
228 all elementary school students<sup>1,41)</sup>. In some countries, the pre-participation screenings are conducted  
229 only for young people participating in a competitive sport<sup>6,18)</sup>. As a result of the heart disease screenings  
230 for all students under the school control in Japan, a clear reduction in mortality from cardiovascular or  
231 large vessel disease has been achieved<sup>42)</sup>. In this study, 9.2% of parents complained that their child had  
232 symptoms related to cardiopulmonary and were recommended for further examination at hospital. Based  
233 on this result, it is desirable to consider introduction of the heart disease screenings for elementary school  
234 students in Cambodia by using Japanese model.

235 Prior to 2000s, urine screening in the elementary school children was initiated in Japan<sup>21)</sup>, Korea<sup>5)</sup> and  
236 Taiwan<sup>17)</sup>. Based on the outcomes of those studies, urine screening in the school was the most effective  
237 method to detect kidney diseases in the early stage to prevent becoming more severe. In this study, 0.3%  
238 of students was detected an abnormality in the urinalysis and recommended to visit a hospital. The  
239 prevalence of abnormal urinalysis was almost the same as the previously reported prevalence in Japanese  
240 elementary school urinalysis of 0.38% (1,056/227,029)<sup>22)</sup>.

241 In our study, 6.9% (20/292) students supposed to have otitis media. However, since none of them had  
242 hearing impaired, we did not recommended for further examination at hospital. Hearing impairment has  
243 been reported that one factor may cause disability in speaking and academic performance in the school  
244 children<sup>3,7,33,39)</sup>. According to the Japanese school health check-ups and the Japan otological society  
245 guideline showed that pure tone audiometry (PTA) is useful appliance to verify the true hearing disorder  
246 as well as previous reported studies<sup>7,13,15,39)</sup>. Hence, we suggested that it would be necessary to apply  
247 PTA in the future school health check-ups research.

248 Dental caries experience was reported by legal guardians of children as 62.3% which lower than  
249 previous a national oral health survey in Cambodia 80.4% in 2011<sup>4</sup>). The risk factors influence dental  
250 caries was food and sugar intake behaviors, poor oral hygiene in children trends to the vast majority in  
251 developing countries<sup>4,26</sup>). As the resulting from our study and Chher et al. showed that oral problem  
252 remains major burden in the public health issues in Cambodia. Therefore, we also suggested the dental  
253 screening should take actions together with school health check-ups to promote health for children in  
254 Cambodia.

255 Expanded Programme Immunization (EPI) was launched in Cambodia in 1986 to response to infectious  
256 diseases such as Diphtheria, Pertussis, Tetanus, TB, Polio and Measles. In 2015, WHO reported the  
257 coverage of EPI in Cambodia had achieved more than 90%, and the incidence had been sharply  
258 decreased in those diseases. For polio, Cambodia has maintained polio-free status since 2000. Cambodia  
259 has also achieved both measles and neonatal tetanus elimination goals in 2015. In addition, there is no  
260 finding of incidence of diphtheria from 2013 to 2015, but pertussis is 0.1 per 100,000 population in 2015.  
261 The incidence of TB was 6,700 per 100,000 population per year in 2016<sup>36</sup>). However, Cambodia is  
262 highly endemic area for HBV infection with high hepatocellular carcinoma mortality rate. It is necessary  
263 to promote the measures against viral hepatitis and hepatocellular carcinoma as an urgent task of the  
264 country together with the preventive measures of other infectious diseases<sup>9,37,38</sup>). In Japan, with the  
265 background of the high hospital birth rate, HBV screening to all pregnant women at the antenatal care  
266 and the administration of Hepatitis B immunoglobulin (HBIG) to those children born from HBV positive  
267 mothers were started from 1986, and Japan has achieved great success for prevention of mother-to-child  
268 (vertical infection)<sup>16,29,30</sup>). On the other hand, universal vaccination (birth dose of HB vaccination)  
269 introduced in Cambodia in 2005. However, in this study, according to the parent reports, the  
270 immunization coverage of Hepatitis B vaccination (41.8%) is the lowest among the National  
271 Immunization Program in Cambodia. Elementary school is supposed to be the most optimal institution  
272 to grasp the health condition of the whole pediatric population where assessment for the vaccination can  
273 be done. From this assessment on HBsAb, it will be useful for catch-up vaccination of HBV to school  
274 children with lack of antibody.

275 Establishment of health check-ups system at elementary schools not only gives an opportunity for health  
276 education by grasping the health condition of children but also has the significance of accumulating

277 national health basic data in ordinary time. In Japan, primary school health examination has been  
278 introduced since the Meiji era, and their basic data functions as a basis for evaluating health problems  
279 caused by atomic bomb damage in Hiroshima and Nagasaki and nuclear damage in Fukushima<sup>25,40</sup>). In  
280 Cambodia as well, based on the fact that nuclear power plants will be introduced in the future, building  
281 such a medical examination system will be an important foundation for knowing the health hazards in  
282 emergency such as radiation disasters and warfare.

283

## 284 **CONCLUSION**

285 This is the preliminary study on the school health check-ups jointed with the government of Cambodia  
286 and researchers from Japan aimed to establish an effective elementary school health check-up system to  
287 Cambodia. We showed the prevalence of healthy among schoolchildren of Cambodia and detected the  
288 students with possibility of health problem through this screening and recommended for visit hospital.  
289 Base on the results, we assume that health check-ups system in elementary school in nationwide will be  
290 effective in assessing the current health status in ordinary time and possibility of early detection of  
291 disease.

292

## 293 **Abbreviations**

294 HPS: Health Promoting Schools; MoEYS: Ministry of Education, Youth and Sport; WHO: World  
295 Health Organization; PTA: Pure Tone Audiometry; OSAS: Obstructive Sleep Apnea, DPT: Diphtheria  
296 Pertussis Tetanus; Hep-B: Hepatitis; Hib: Haemophilus Influenzae Type B; Syndrome; EPI: Expanded  
297 Program on Immunization.

298

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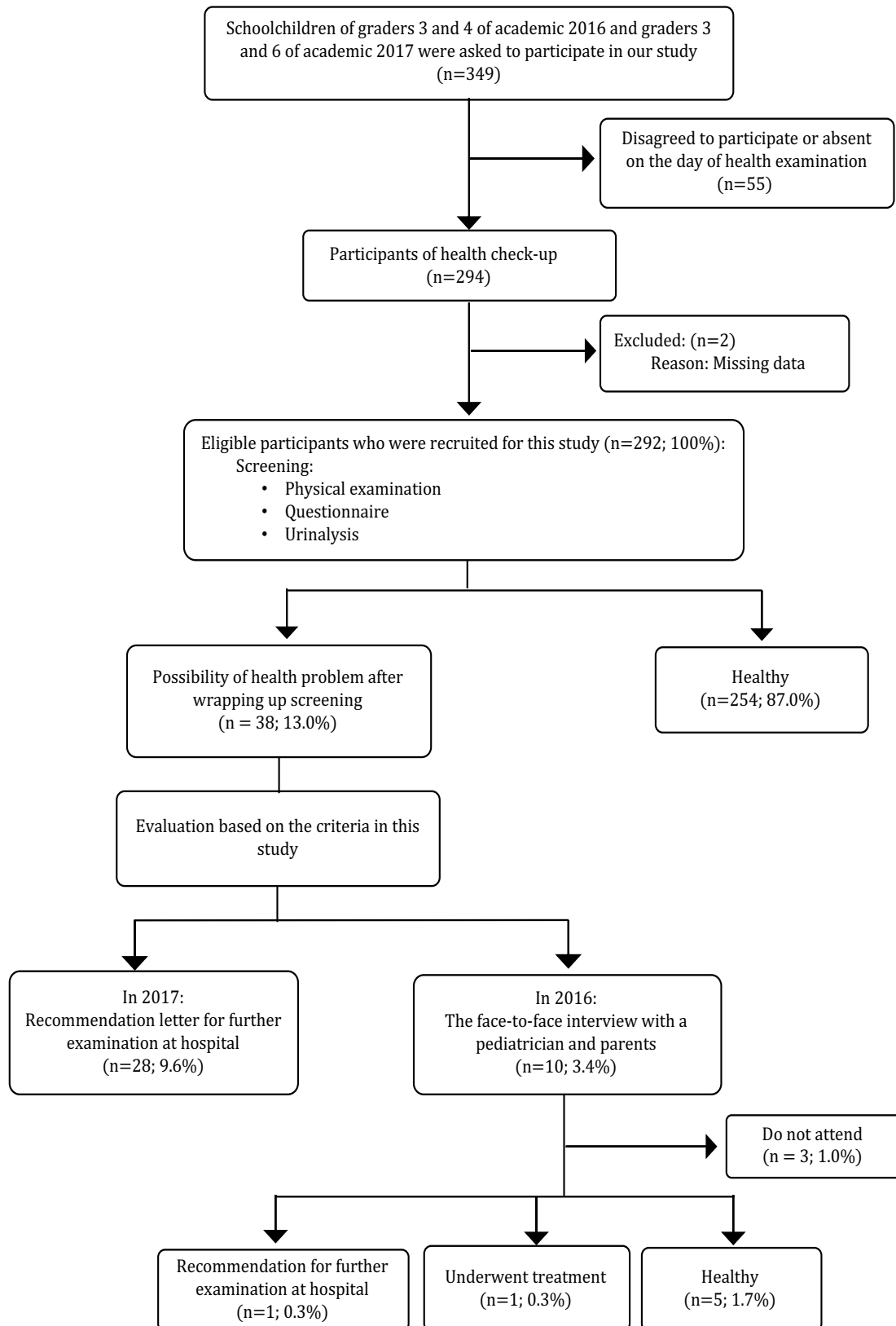
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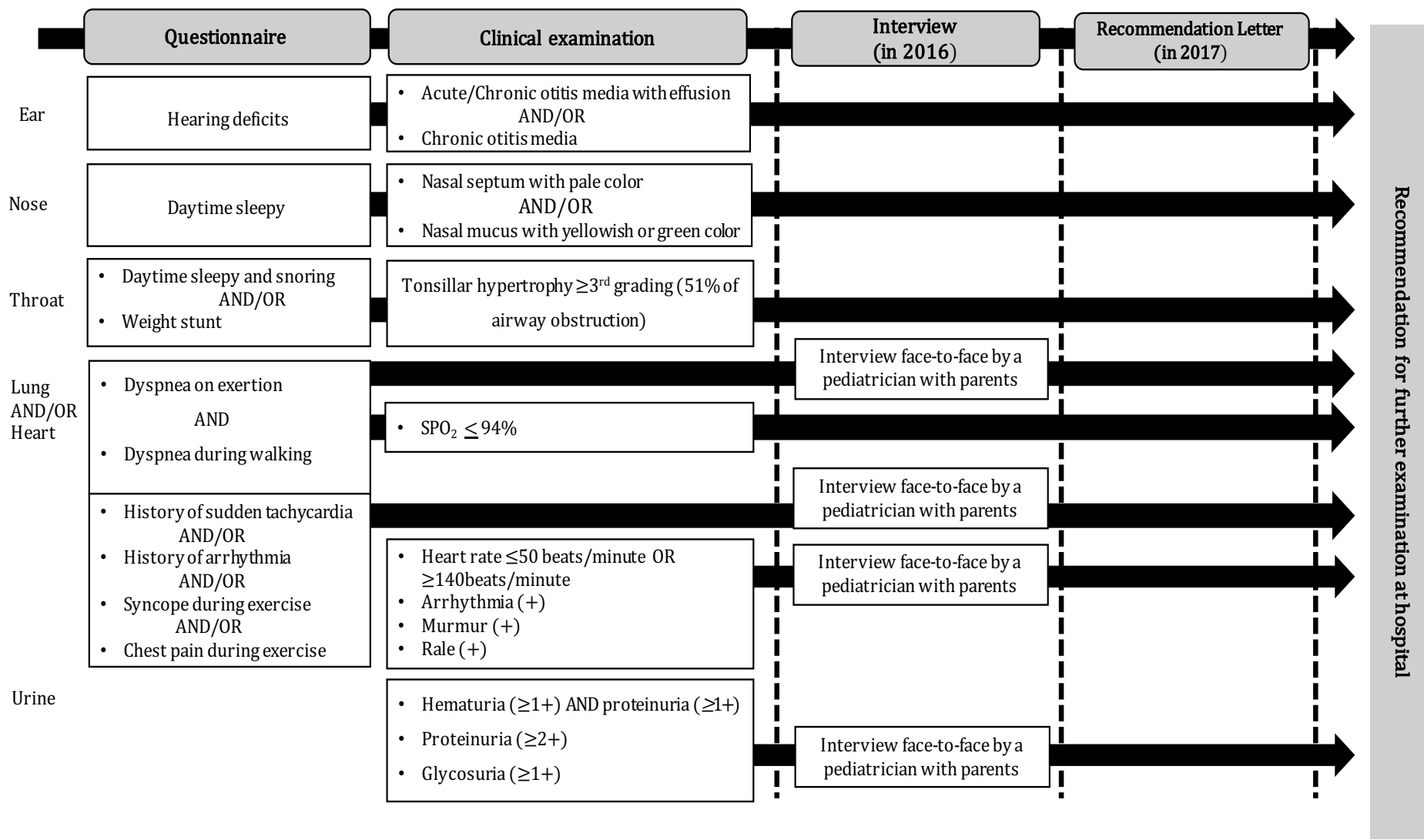


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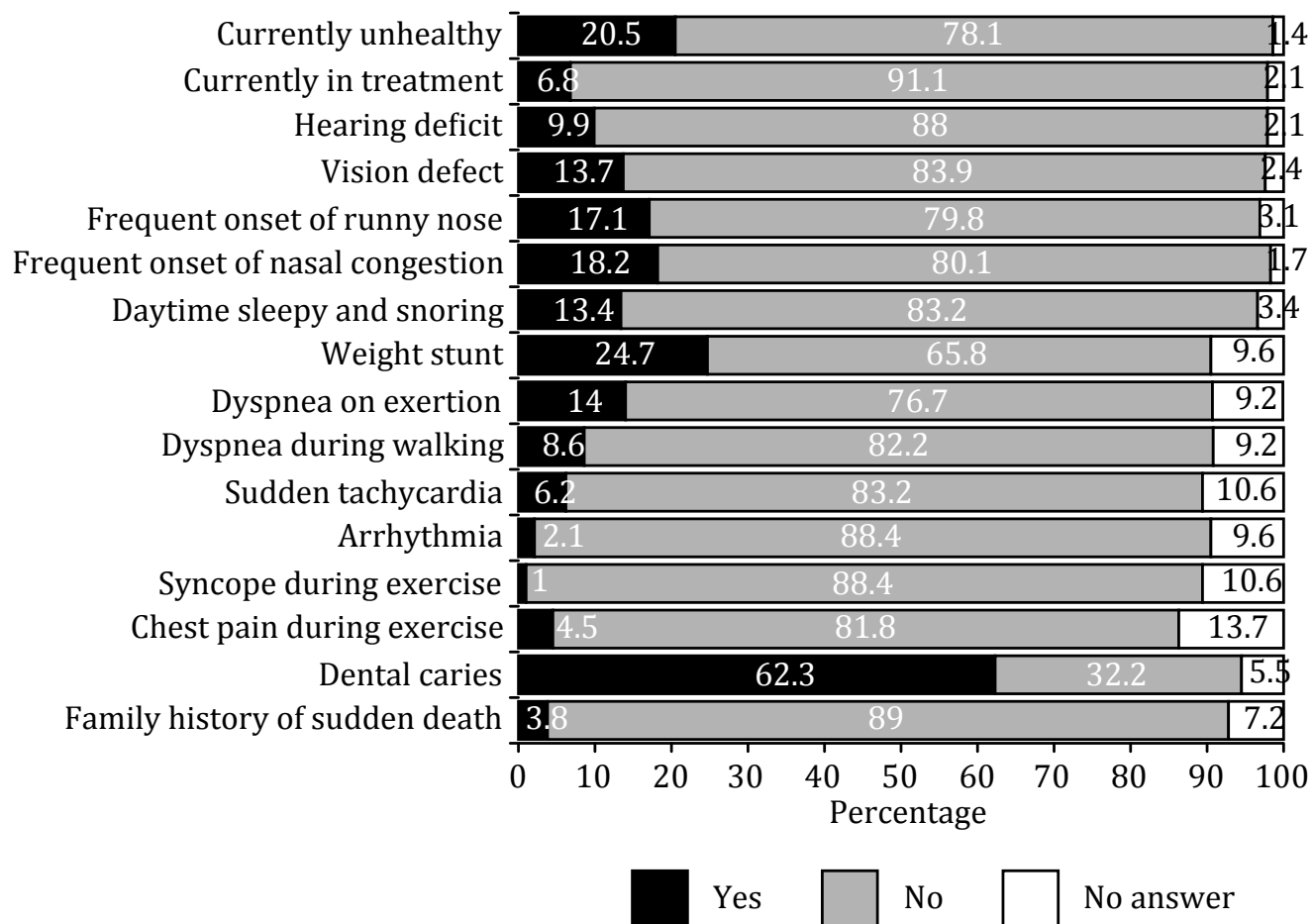
**Figure 1: Flow diaphragm of study participants.**

This flow chart shows the process of health check-ups model us ed in our study.



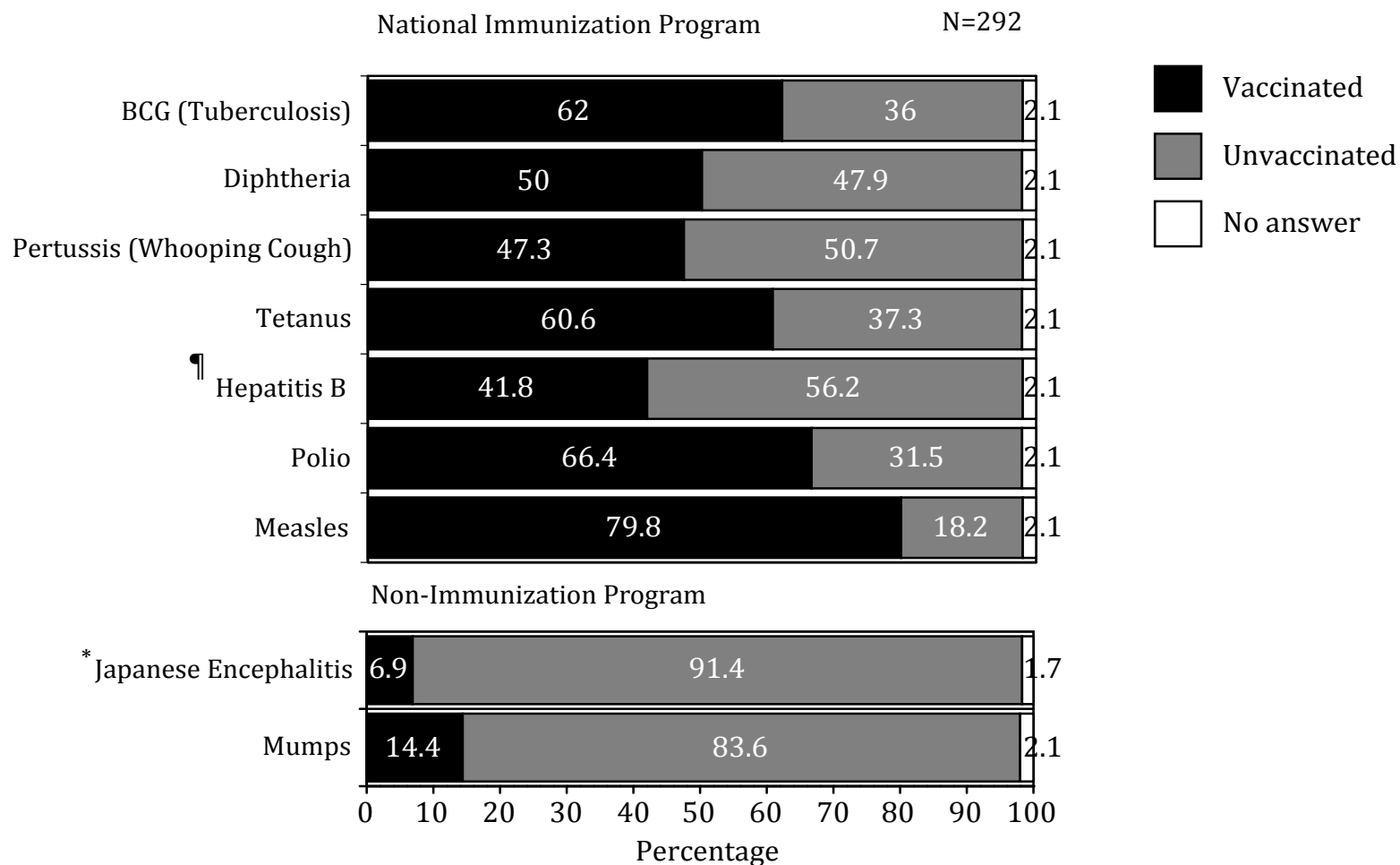
**Figure 2: Evaluation criteria of the school children recommend for further examination of our study**

This algorithm shows how the final decision on the health check-ups is done based on the results of questionnaires, clinical examination, face-to-face interview with the corresponding parents/guardians in 2016 and recommendation letter in 2017.



**Figure 3: The results of questionnaire responded by parents or guardians of the school children (n=292)**

This figure shows the distribution of health problems found among school children based on the questionnaires. In each bar, the black color indicates “yes”, the grey color represents “No” and the white color for “No answer” to the questions.



**Figure 4: Questionnaire answered to the vaccination history of the school children by the legal guardians**

Each bar shows the response to questions related to vaccination history among studied children to those vaccines administered by Ministry of Health in Cambodia. The black color indicates “already vaccinated”, the grey color for “unvaccinated” and the white color for “No answer” to the questions. The signature “¶” means that Hep-B vaccine is introduced in 2001 and Monovalent Hep-B (received vaccine less than 24hours after birth) and Pentavalent Including Hep-B, Hib, DPT 3 doses (4, 6, 10 weeks of age) has been adopted in national immunization program since 2005. The signature “\*” indicates that Japanese Encephalitis vaccine has been introduced in 3 provinces since 2010.

Table1. Characteristic of the school children (n=292)

Age as of examination (years)	Total n(%)	Girl n(%)	Boy n(%)
7	3(1.0)	1(0.8)	2(1.3)
8	63(21.6)	37(27.8)	26(16.4)
9	93(31.9)	42(31.6)	51(32.1)
10	43(14.7)	13(9.8)	30(18.9)
11	40(13.7)	16(12.0)	24(15.1)
12	31(10.6)	17(12.8)	14(8.8)
13	12(4.1)	6(4.5)	6(3.8)
14	3(1.0)	0(0.0)	3(1.9)
15	2(0.7)	0(0.0)	2(1.3)
16	1(0.3)	1(0.8)	0(0.0)
17	1(0.3)	0(0.0)	1(0.6)
Total	292(100.0)	133(100.0)	159(100.0)

This table indicates distribution of 292 school children who participated in our study by age and sex.

Table 2. Body Mass Index-for-age (5-19 years) WHO growth reference 2007 of schoolchildren (n=292)

Overall	Total (n=292) n(%)	Girl (n=133) n(%)	Boy (n=159) n(%)
Obesity: >+2SD	17(5.8)	5(3.8)	12(7.5)
Overweight: >+1SD	27(9.2)	14(10.5)	13(8.2)
Normal	233(79.8)	101(75.9)	122(76.7)
Thinness: <-2SD	22(7.5)	12(9.0)	10(6.3)
Severe thinness: <-3SD	3(1.0)	1(0.8)	2(1.3)

This table indicates the body mass index from height and weight measurement from our study

Table 3. The results of physical examination (n=292)

Variable	Examination	Categories	Clinical signs	n(%)
Ear	Eardrum	Normal		240(82.2)
		Invisible	Bilateral	19(6.5)
			Unilateral	10(3.4)
		Rupture		6(2.1)
		Other	Cerumen	43(14.8)
			Injury	9(3.1)
			Bloody	6(2.1)
			Muddy	5(1.7)
			Effusion	4(1.4)
			Inflammation	4(1.4)
Discharge	1(0.3)			
Nose	Color of septum	Normal		290(99.3)
		Red		2(0.7)
		Pale		0(0.0)
	Color of mucus	Normal		292(100.0)
		Green/yellowish		0(0.0)
		White		0(0.0)
Throat	Tonsil	Grade 1 ( $\leq 25\%$ )		239(81.9)
		Grade 2 (25 - 50%)		27(9.3)
		Grade 3 (51 - 75%)		2(0.7)
		Grade 4 ( $\geq 76\%$ )		0(0.0)
		Invisible		24(8.2)
Heart	Heart rate	Bradycardia ( $\leq 50$ b/m)		0(0.0)
		Normal (51 -115 b/m)		292(100.0)
		Tachycardia ( $\geq 140$ b/m)		0(0.0)
	Arrhythmia	No arrhythmia		292(100.0)
		Arrhythmia		0(0.0)
	Heart murmur	No murmur		292(100.0)
Murmur			0(0.0)	
Lung	Oxygen saturation	SpO2 $\leq 94\%$		4(1.4)
		SpO2 $>94\%$		288(98.6)
	Lung sound	Normal		290(99.3)
		Rale		2(0.7)

This table indicates the clinical findings among 292 school children by examined physical examination in our study.



Table 4. The result of urine analysis of the school children (n=290)

		Proteinuria				
		Negative n(%)	Trace n(%)	1+ n(%)	2+ n(%)	3+ n(%)
Hematuria	-	214(73.8)	50(17.2)	7(2.4)	0(0.0)	0(0.0)
	Trace	13(4.5)	5(1.7)	0(0.0)	0(0.0)	0(0.0)
	1+	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
	2+	0(0.0)	0(0.0)	1(0.3)	0(0.0)	0(0.0)
	3+	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)

This table indicates the outcomes of urine analysis from 290 school children who submitted the urine specimens. In the box, the black color indicates “the school children suspected with urine abnormality during health check-up” and the white color indicates “the school children didn’t find the urine abnormality during health check-up”.