# Japanese education system on health and health-associated knowledge evaluation scale for adolescence-pilot study

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## Abstract

The lack of basic knowledge on medical issues threatens the college students' physical and mental health. In Japan, common core standards for high-school education address 4 categories on health education: modern society and health, secured social life, life stage and health, and provision of environment for health-promotion. We have developed a pilot scale to evaluate basic knowledge through systematic review, expert opinion of medical doctors and health providers, and web-based survey.

## Background

We often face cases that the lack of basic knowledge on medical issues is a cause of diseases or accidents. In Japan, common core standards for high-school education on health have 4 categories : modern society and health, secured social life, life stage and health, and provision of environment for health-promotion. However, little is known about the degree of understanding the common core standards on health, because different from math or science, health is not a subject that comprises the entrance examination of collage, so there is little incentive of the high-school students to study hard.

In the field of pedagogy, learning is classified into deliberate learning or incidental learning. Deliberate learning is traditional way of learning using textbook. Incidental learning is learning from daily life including media or daily conversations.

## Method

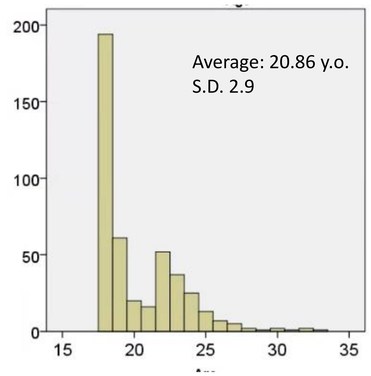
Corresponding to four categories and their sub-categories of health education of common core standards for high-school, we developed 49 questions using expert opinion technique. Four doctors, 2 nurses and a pharmacist involved in a 30-minute interview (on-line or in-person).

Web-based questionnaire was developed using these 49 questions. Recruitment posters were displayed on the site of annual check-up for University of Tokyo students and for the newcomers a recruitment brochure was distributed. Amazon® gift card (500 JPY, about 4 USD) was given to all the participants.

The answers were analyzed using IBM SPSS statistics ver.24 (IBM, Chicago, IL). Factor analysis (principal components analysis) was followed by Promax rotation.

## Result 1. Characteristics of participants

| | n | % |
|---|---|---|
| **Participants** | 439 | |
| **Gender** | | |
| **Male** | 301 | 68.6% |
| **Female** | 134 | 30.5% |
| **Decline to answer** | 4 | 0.9% |
| **Specialities** | | |
| **Humanities** | 141 | 32.1% |
| **Sciences** | 298 | 67.9% |
| **Medicine/Pharmacy** | 41 | 9.3% |
| **Program** | | |
| **Bachelor degree** | 304 | 69.2% |
| **Master degree** | 93 | 21.2% |
| **Doctor degree** | 42 | 9.6% |




## Result 2 Questions and correct rate

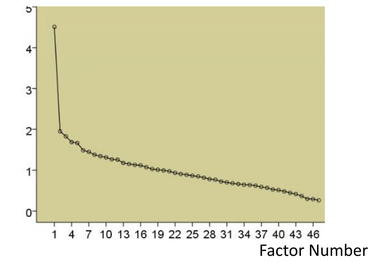
| Q | Correct Answer | Percentage of correct answer |
|---|---|---|
| **1 In Japan, male live longer than female.** | No | 95.0% |
| 2 Primary cause of death of people in their twnties is accident. | No(*1) | 70.2% |
| 3 The number of birth, where the mother is over 35, is more compared to 20 years ago. | Yes | 92.9% |
| 4 Tortal fertility rate in Japan is around 2 (between 1.8 and 2.2). | No | 82.7% |
| 5 Quality of Life (QOL) is an index reflecting the economic state such as purchasing power. | No | 94.1% |
| 6 Individual effort is not enough to live a healthy life. | Yes | 96.1% |
| 7 There is an individual difference on susceptibility of lifestyle diseases. | Yes | 97.5% |
| **8 It is recommended to consult a doctor when you cough for a long time.** | Yes | 99.8% |
| 9 People will die in about 5 years after getting infected with human immunodeficiency virus (HIV). | No | 90.2% |
| **10 There are cancers that can be prevented by vaccination.** | Yes | 61.7% |
| 11 Oral contraceptives are good for preventing sexually transmitted diseases (STS). | No | 80.0% |
| 12 Some vaccinations are required when you go abroad. | Yes | 99.5% |
| 13 Overuse of antibiotics will lead to the resintance of bacteria. | Yes | 88.6% |
| 14 Appropriate exercise habits help recover from lifestyle diseases. | Yes | 97.7% |
| 15 Sleep disorders will increase the possibility of accident in the daytime. | Yes | 99.5% |
| **16 Excessive intake of vitamins are not harmful.** | No | 94.1% |
| 17 Carbohydrates, proteins and lipids are energy sources. | Yes | 85.2% |
| **18 Some cancers are caused by bacterial infection.** | Yes | 64.5% |
| **19 Smoking can cause an addiction.** | Yes | 99.5% |
| **20 Tobacco contains carcinogens, substances that cause cancers.** | Yes | 98.9% |
| 21 Electronic cigarette (e-cigarette) can hardly cause health damage. | No | 95.0% |
| 22 Use of illegal drugs has no relation to the safty of society. | No | 97.9% |
| **23 What drug is illegal varies from state to state.** | Yes | 99.8% |
| 24 Legal drinking age is 18 in Japan. | No | 98.4% |
| **25 There is little individual difference in decomposition rate of alcohol.** | No | 97.7% |
| 26 Some died due to taking "Diet pills." | Yes | 98.2% |
| 27 Privately imported medicies have a risk of being fake medicines. | Yes | 99.1% |
| 28 Insomnia often happens when your physical or mental status is not good. | Yes | 100.0% |
| 29 Depression is a cause of suicide. | Yes | 99.8% |
| 30 Expressing unrealizable desire by art or science is regarded as a good way to cope with stress. | Yes | 90.9% |
| **31 No mortal cases are reported on bike.** | No | 97.3% |
| 32 People over 65 account for more than half of the traffic deaths. | Yes(*2) | 45.6% |
| 33 In Japan, around 3,000 people died due to traffic accident. | Yes | 78.8% |
| 34 Heat stroke can be recoverd just by taking a rest. | No | 92.7% |
| **35 Only qualified persons can use an automated external defibrillator(AED).** | No | 98.2% |
| 36 The possibility of necessity of infertility treatment increases when maternal age is over 35. | Yes | 88.4% |
| 37 Maternity leave is one of the leagal systems that help mothers continue working after giving birth | Yes | 94.5% |
| 38 Extravaginal ejaculation is not regarded to be a good way of contraception. | Yes | 97.9% |
| 39 There was a case of pollution due to organic marcury in Kumamoto and Niigata prefecture. | Yes | 97.7% |
| 40 It is required to meet the criteria of exhaust gas to pass the autmobile inspection. | Yes | 87.9% |
| **41 Products made of natural materials do not cause allergy.** | No | 98.4% |
| 42 The number of organ donor is insufficient. | Yes | 99.3% |
| 43 You'll get some money if you donate lots of blood. | No(*3) | 92.9% |
| **44 Some medicine needs doctor's prescription to be purchased at pharmacy.** | Yes | 96.8% |
| **45 There is no side effects in over the counter medicine (OTC).** | No | 98.9% |
| 46 ".go.jp" is a domain of Japanese government. | Yes | 72.9% |
| 47 Medical insurance is mandatory to all the residents in Japan. | Yes | 76.3% |
| 48 It is important to recognize the sender when you read on-line articles. | Yes | 97.0% |
| 49 Biased information will mislead you. | Yes | 99.8% |

Note: Items in bold are items remained after factor analysis.
Red number in percentage of correct answer column means less than 90%.
*1: In U.S. accident is a primary cause of death in their twenties
*2: In U.S. people over 65 accounts for about 18% of the traffic deaths.
*3: In U.S. you can get some money by donating your blood.

## Result 3. Factor analysis

Eigen Value

Scree plot




After omitting Q28, which all answered correctly, we set the number of factors 5 considering the scree plot. The item that has the least commonality score was omitted one by one to reach the score more than 0.35.

Principal components analysis followed by Promax rotation

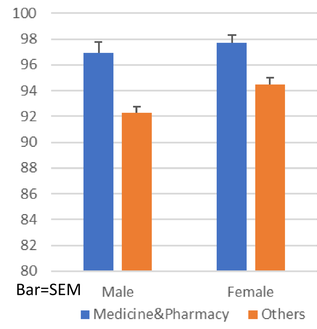
| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Q8 | 0.845 | 0.006 | -0.001 | 0.029 | 0.000 |
| Q19 | 0.837 | -0.005 | -0.006 | -0.034 | 0.000 |
| Q35 | -0.002 | 0.870 | -0.058 | 0.045 | -0.015 |
| Q25 | 0.002 | 0.522 | 0.012 | -0.071 | -0.028 |
| Q41 | 0.004 | 0.485 | 0.226 | -0.028 | -0.018 |
| Q45 | 0.009 | -0.003 | 0.881 | -0.009 | 0.004 |
| Q31 | 0.003 | 0.096 | 0.502 | -0.051 | -0.008 |
| Q16 | -0.022 | -0.035 | 0.429 | 0.167 | 0.008 |
| Q10 | -0.002 | 0.055 | 0.011 | 0.753 | 0.015 |
| Q18 | 0.017 | -0.093 | 0.057 | 0.489 | -0.081 |
| Q20 | -0.021 | -0.018 | 0.038 | 0.197 | -0.022 |
| Q23 | 0.005 | -0.007 | -0.013 | 0.019 | 0.830 |
| Q44 | -0.004 | -0.064 | 0.002 | -0.091 | 0.308 |
| Q1 | -0.007 | 0.141 | 0.120 | -0.037 | 0.235 |

| Factor | Name | Cronbach's alpha |
|---|---|---|
| 1 | cigarette | 0.828 |
| 2 | understanding diversity | 0.699 |
| 3 | safety | 0.614 |
| 4 | cancer | 0.434 |
| 5 | regulation | 0.369 |

## Result 4. Validation

Each factor score was calculated as an average of all items constituting the factor. Total score was calculated by multiplying the sum of all the factor score by 20, so that total score ranges 0 to 100 theoretically. Known-group validity was confirmed by comparing participants who majors medicine or pharmacy and others. Total score and factor 4 showed statistically significant($p<0.05$) increase in the medicine or pharmacy group (one-way ANOVA).

Total score = 20 x Σ each factor score




## Discussion

Common core standards were made by the official committee run by the government and serve as a criteria and goal of study of high-school education. We have developed 49 items reflecting the common core standards and the average percentage of correct answers of our university students was as high as 91.3%. This high number indicates that students already have enough health-associated knowledges, which should be pleased in terms of health promotion to college students. But this high number is also the limitation in developing the scale and only 14 items remained after the factor analysis.

To our surprise, the categorization does not reflect the curriculum but reflect topics that may interest to the students. This suggests students obtain the health-associated knowledge mainly from daily life including media or web, not from the high-school class. There were some questions whose percentage of correct answers are less than 90 %, which include questions about **vaccine preventable diseases, insurance system, web literacy, and infertility treatment**. These topics **may be difficult to learn incidentally because misleading information is abundant, or because they rarely come up in conversation of high-school students.** We believe such topics should be deliberately leaned in the high school class.

**This study suggests that study on health-associated knowledge of college student is helpful to review the high-school curriculum on health, which in turn will lead health promotion of future college students.**

## C.O.I. Funding and Ethics

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