



## Data Resource Profile

# Data Resource Profile: The Korea Youth Risk Behavior Web-based Survey (KYRBS)

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## Data resource basics

The Korea Youth Risk Behavior Web-based Survey (KYRBS)<sup>1</sup> was established in 2005 by the Centers for Disease Control and Prevention (CDC) in South Korea (hereafter ‘Korea’). KYRBS is an ongoing national cross-sectional survey that assesses health-risk behaviours among middle- and high-school students, monitors progress toward achieving national health objectives of the Korea’s National Health Plan 2020<sup>2</sup> and provides data for the development and evaluation of school health policies and programmes in Korea. The survey has been financially supported by the National Health Promotion Fund of Korea and annually conducted with administrative cooperation of the Korean Ministry of Education.

KYRBS focuses on health-risk behaviours among adolescents. The questionnaire consists of items on tobacco use, alcohol use, obesity and weight control effort, physical activity, dietary behaviours, injury, sexual behaviours, mental health, oral health, personal hygiene, substance use, socioeconomic status, atopy and asthma, internet addiction and violence (Table 1).

The target population for the survey is nationally representative middle- and high-school students aged 12–18 years in Korea. Approximately 75 000 students from 400 sampled middle and 400 sampled high schools have

participated in the survey conducted between June and July each year. Students anonymously completed the self-administered questionnaire in a computer laboratory of each sampled school. The steering committee representing the Office of Education from 17 provinces of Korea oversees the survey.

## Data resource area and population coverage

KYRBS uses a multi-stage cluster sampling design to obtain a nationally representative sample of Korean students in middle and high schools. The target population comprises all public and private middle- and high-school students of 17 provinces in Korea. The sampling plan has been designed each year since 2011 (every 3 years between 2005 and 2010). In the first stage of the sampling, schools are selected as primary sampling units (PSUs). Within a PSU, one classroom of each grade is sampled using the systematic sampling method. In 2005, the third grades of high schools were excluded because of a scheduled national college entrance examination. All grades in middle and high schools have been selected since 2006. All students in the sampled classes are eligible to participate. The average sample size was 77 105 between 2006 and 2014. The probability of being selected was 2% of total middle- and

**Table 1.** Survey questions of the Korea Youth Risk Behavior Web-based Survey in 2014

Domains	Questions	Items	Indicators
Total	125		103
Tobacco use	19	Lifetime and monthly use of cigarettes and e-cigarettes; reasons for smoking; age of initiating smoking; age of daily smoking; amount of monthly smoking; place of smoking; methods to obtain cigarettes; availability of cigarettes; experience of quitting smoking; reasons to quit smoking; exposure to secondhand smoke; perception of anti-smoking advertisement; smoking behaviours of parents, family members and friends; experience of seeing teachers (or school staff) smoking outside school buildings; experience of smoking prevention education in schools	19
Alcohol use	8	Lifetime and current alcohol use; age of initiating alcohol drinking; amount of monthly alcohol consumption; alcohol problems; methods to obtain alcoholic beverages; availability of alcoholic beverages; experience of alcohol prevention education in schools	9
Physical activity	9	Physically active at least 60 min per day; vigorous physical activity; muscle strengthening activities; walking; sedentary behaviour at weekends and on weekdays; physical education classes; sports team in schools	3
Dietary behaviours	14	Skipping breakfast, lunch, dinner; reasons for skipping breakfast; frequency of consumption of fruit, vegetables and milk; frequency of consumption of soda, highly caffeinated beverages, sweetened beverages, fast food, instant noodles and snacks; experience of nutrition education in schools	14
Obesity and weight control effort	5	Height; body weight; monthly weight control; inappropriate methods for weight loss; distorted body perception	8
Mental health	10	Perceived stress; perception of getting enough sleep; sleep duration during weekdays and at weekends; feelings of sadness or hopeless; contemplation of suicide attempt; suicide plan; suicide attempt; treatment by a doctor due to suicide attempt; perceived happiness	8
Unintentional injury	4	Use of a seat belt in car, taxi, express bus; treatment by a doctor due to injury in schools; safety education at school; treatment by a doctor due to injuries related to mobile phone use	6
Oral health	8	Tooth brushing per day; tooth brushing after lunch in school; use of fluoride toothpaste; use of oral care products; dental sealants; dental scaling; dental problems; dental health education in schools	7
Personal hygiene	2	Hand-washing with soap before meal in school or at home; hand-washing with soap after using toilet in school or at home; hand-washing with soap after going out; personal hygiene education in schools	5
Substance use	5	Lifetime substance use; reasons for substance use; first substance use	1
Sexual behaviours	10	Age at first menstruation or wet dream; lifetime sexual intercourse; sexual intercourse after drinking alcohol; age at first sexual intercourse; use and methods of contraception; pregnancy experience; abortion experience; sexually transmitted disease experience; experience of sexual health education in schools	9
Atopy and asthma	12	Diagnosis of asthma, rhinitis, eczema; treatment of asthma, rhinitis, eczema; absence from school due to asthma, rhinitis, eczema	9
Internet addiction	1	Average amount of time spent using internet for studying and other on weekdays and at weekends	4
Demographic variables and health equity	16	Sex; birthday (year and month); family members; living with biological or adoptive parent; parental education level; parents' country of birth; perceived academic record; perceived household economic status; residence type; relationship with family, friends, teachers; experience of having part-time jobs; weekly average allowance; school grade	–
Violence	1	Experience of being treated by doctor due to violence	–
Other	1	Perceived health status	1

**Table 2.** The numbers of sampled schools and students, the probability of being sampled and associated response rates in the Korea Youth Risk Behavior Web-based Survey between 2005 and 2014

Year	No. in population		No. in sample		Response rate (%)	
	School	Students	School (selection probability, %)	Student (selection probability, %)	School (no. of participating schools/no. of sampled schools)	Students (no. of participating students/no. of eligible students sampled)
2005	5112	3174637	800 (15.6)	65482 (2.1)	99.9 (799/800)	89.7 (58727/65482)
2006	5203	3851168	800 (15.4)	78593 (2.0)	99.9 (799/800)	90.9 (71404/78593)
2007	5243	3904533	800 (15.3)	78834 (2.0)	99.8 (798/800)	94.8 (74698/78834)
2008	5314	3930597	800 (15.1)	79099 (2.0)	99.5 (796/800)	95.1 (75238/79099)
2009	5398	3972764	800 (14.8)	76937 (1.9)	100.0 (800/800)	97.6 (75066/76937)
2010	5442	3917241	800 (14.7)	74980 (1.9)	100.0 (800/800)	97.7 (73238/74980)
2011	5475	3832799	800 (14.6)	79202 (2.1)	100.0 (800/800)	95.5 (75643/79202)
2012	5508	3745735	800 (14.5)	76980 (2.1)	99.6 (797/800)	96.4 (74186/76980)
2013	5541	3672574	800 (14.4)	75149 (2.0)	99.9 (799/800)	96.4 (72435/75149)
2014	5558	3532149	800 (14.4)	74167 (2.1)	99.9 (799/800)	97.2 (72060/74167)

The selection probabilities are probabilities of being selected from total middle and high schools and their total students in South Korea.

high-school students and 14%–15% of total middle and high schools in Korea (Table 2).

All statistics of this survey have been calculated to represent Korean middle- and high-school students after taking into account complex survey designs, selection probabilities, survey non-responses and post-stratification.

### Survey frequency and response rate

KYRBS has been conducted every year since 2005. The survey period has changed from September and October in 2005–09 to June and July since 2010, to enable CDC to publicly release major statistics of each survey year by the end of the survey year.

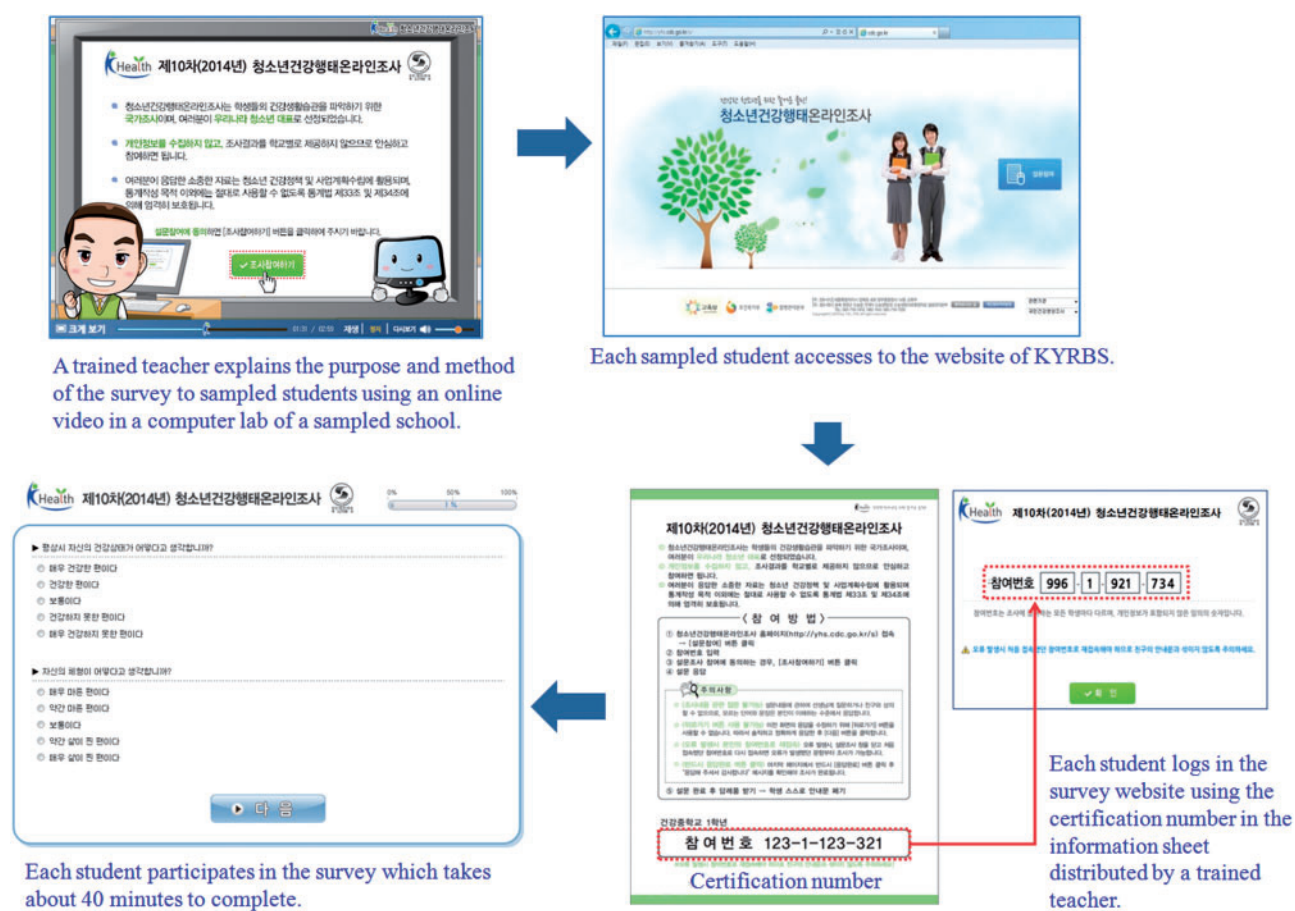
The response rate has been maintained at over 95% since 2007. These high levels of response rate have been possible because the survey was administratively supported by the Ministry of Education and sampled students completed anonymous self-administered web-based questionnaires during one class period, except for those who were absent on the day of the survey (Table 2).

### Measures

KYRBS consists of questions to address the public health and social needs in Korea for data on health-risk behaviours among youth. In 2005, the survey originally included 92 questions in 11 domains of health-risk behaviours covering tobacco use, alcohol use, obesity and weight control effort (e.g. whether trying to lose body weight, unhealthy behaviours like fasting or taking diet pills to lose body

weight), physical activity, dietary behaviours and injury. To revise the questionnaire, experts from academia and government officials from the Ministry of Education, the Ministry of Health and Welfare and the Ministry of Gender Equality and Family in Korea have been invited to submit proposals for new survey items. All of proposals have been reviewed by 15 academic advisory committees specialized in youth health-risk behaviours and a senior advisory committee representing academic societies in Korea. To include additional questions in KYRBS, CDC has taken into account public concerns on new or unstudied school health issues, technical and methodological feasibility (e.g. the validity and reliability information of the questions, time requirement in responding, respondents' burden to answer) and specific relevance of questions to KYRBS rather than to other national surveys in Korea. Socioeconomic status related to health equity, atopy and asthma, internet addiction and violence were added to the questionnaire in 2006, 2007, 2008 and 2012, respectively. The 2014 questionnaire consists of 125 items in 15 domains of health-risk behaviours (Table 1).

In 2008, we conducted a reliability test of the questionnaire for 2298 middle- and high-school students participating in self-administered web-based questionnaire surveys, with the two surveys being approximately 2 weeks apart. Among 39 indices of health-risk behaviours, seven indices (17.9%) had kappas  $\geq 81\%$ , 21 indices (53.8%) had kappas between 61% and 80% and 11 indices (28.2%) had kappas between 41% and 60%. The percentage agreement ranged between 77.6% and 100.0% for all indices.<sup>3</sup> In our additional study on the validity of obesity prevalence, body



**Figure 1.** The survey procedure of the Korea Youth Risk Behavior Web-based Survey.

height and weight were directly measured in a convenience sample of 137 middle- and 242 high-school students after self-reported values were obtained from the web-based survey. Even though the prevalence estimate of obesity based on self-reported data (10.6%) was lower than that based on directly measured data (15.3%), the estimated sensitivity of obesity based on self-reported data was 69.0%, specificity was 100.0% and the kappa was 79%.<sup>4</sup> Additionally, the estimates of cigarette smoking prevalence based on urine cotinine (the cut-off point of urinary cotinine was 50 ng/dl) in 235 high-school students showed good validity (sensitivity 92.0%, specificity 93.0%).<sup>5</sup>

To ensure data quality, survey administrators use standardized operational procedures. Before conducting a survey, CDC performs nationwide training programmes for teachers (mostly nurse teachers in schools, excluding home teachers of the sampled class) from the sampled schools between April and May each year, to help ensure the standardized data collection of the survey. A trained teacher in each school registered information on the characteristics of schools and the numbers of male and female students of all classes in her/his school via the website of KYRBS [http://

yhhs.cdc.go.kr]. This information is used to select classes (one class per each grade) and to create sample weights.

KYRBS has been conducted between June and July each year since 2010. Procedures of KYRBS were designed to protect students' privacy by ensuring anonymous and voluntary participation. The trained teacher distributes an information sheet to each student and explains the purpose and participation procedure of the survey using instructional materials (an animation file or a PowerPoint file) in a school computer laboratory where internet access is available. Students log in using the certificate number printed on the information sheet, and check online informed consent (Figure 1). Then students complete the anonymous self-administered web-based questionnaire during one class period. It takes about 40 min for students to set up the survey and complete the questionnaire. The CDC's Institutional Review Board has approved the protocols for KYRBS.

## Data resource use

KYRBS has supported 28 indicators of the National Health Plan 2020 goals, such as current cigarette use, current



alcohol use, perceived stress, brushing teeth, vigorous physical activity, lifetime drug use, lifetime sexual intercourse and so on. For example, CDC conducted a study examining time trends of smoking rates for adults and adolescents using the KYRBS and the Korea National Health and Nutrition Examination Survey (KNHANES)<sup>6</sup> data, and provided evidence that the National Health Plan 2020 targets for smoking prevalence among both adults and adolescents are not expected to be met.<sup>7</sup> KYRBS also provides data on current tobacco use, harmful use of alcohol, and insufficient physical activity for voluntary global targets for the prevention and control of non-communicable disease.<sup>8</sup> The KYRBS data are also used to evaluate school health policies of the Korean Ministry of Education, including programmes for brushing teeth after lunch, washing hands after using the toilet, tobacco and alcohol use prevention education, physical activity education, mental health promotion and violence prevention in schools. In addition, data are used to monitor a ban on the sale of cigarettes and alcohol to people under age of 18, based on the Juvenile Protection Act in Korea. One important example of monitoring impacts of governmental policies on adolescent health behaviours with use of KYRBS data is school health promotion policies in 2006–08 in Korea. In the late 2000s, the Korean Ministry of Health introduced a ban on carbonated beverages in school (since 2006), mandatory nutritional labelling on school meals (since 2008) and the Special Act on the Safety Management of Children's Dietary Life (since 2008). A previous study showed that the frequency of consumption of unhealthy food (carbonated beverages, fast food, instant noodles and confectioneries) have meaningfully decreased after the implementation of these government nutritional policies for adolescents.<sup>9</sup>

As of August 2015, approximately 170 publications [available at <http://yhs.cdc.go.kr>] by researchers using KYRBS data have been made in international and domestic journals, poster presentations on academic conferences, dissertations and the Public Health Weekly Report (published by CDC). The main issues for research were prevalence of health-risk behaviours, risk factors related to unhealthy behaviours, and associations between health behaviours. For example, there are reports on trends in cigarette use behaviours in Korea,<sup>7,10</sup> associations among smoking, alcohol drinking and suicidal behaviours,<sup>11</sup> relationships between socioeconomic position and health-risk behaviours,<sup>12,13,14</sup> and associations of asthma symptoms with cigarette smoking and alcohol consumption.<sup>15</sup> One report examined the impact of a nutritional policy on socioeconomic inequalities on unhealthy food intake among Korean adolescents.<sup>9</sup>

CDC has provided annual workshops for data users to promote the broader and more proficient use of the data

since 2011. The workshops have been held seven times up to 2015, with attendance of approximately 400 researchers at each workshop.

## Strengths and weaknesses

KYRBS has several strengths. KYRBS is an ongoing survey with nationally representative samples of Korean school adolescents. The probability of being selected among total middle-and high-school students in Korea is 2% and the response rate has been very high (over 95%). The survey procedure protects respondents' privacy, which contributed to detection of greater prevalence of delinquent behaviours (e.g. smoking prevalence) in KYRBS than in other interview surveys (e.g. KNHANES) for Korean adolescents. Data files and major statistics are publicly released in the survey year, to provide timely access to statistics on adolescents' health behaviours in Korea.

The KYRBS has two major limitations. First, it may not be representative of all youth aged 12–18 years in Korea, because the participants are limited to school students. However, based on our calculation using data from the Korean Ministry of Education and Statistics Korea, approximately 1.8% of persons aged 12–17 years were not enrolled in school. Second, data are based on self-reports from students who may under- or over-report their behaviours or attitudes. CDC conducted a study to assess the validity of the self-reported height, weight and current cigarette use.<sup>4,5</sup> The estimates of self-reported cigarette smoking and urine cotinine showed a good validity.<sup>5</sup> However, body weight was under-reported by 1.1–1.7 kg and height was over-reported by 0.1–0.5 cm,<sup>4</sup> as reported in other studies.<sup>16,17</sup> Thus, CDC tracks obesity trends by schools, grades and regions using KYRBS data after considering the magnitude of under- and over-estimation of body weight and height, with the point prevalence of obesity in adolescents estimated from KNHANES.<sup>6</sup> CDC will conduct studies on reliability and validity of our KYRBS questionnaires periodically, and are now conducting a study to assess the reliability of all questionnaires and validity of self-reported smoking behaviours, using urine cotinine, in more than 1000 sub-samples of 2015 KYRBS.

## Data resource access

The reports and microdata of KYRBS are released annually in December each year. The KYRBS website [<http://yhs.cdc.go.kr>] contains microdata files, reports and publications for the survey. Further information and enquiries can be submitted to the corresponding author, Kyungwon Oh, at [[kwoh27@korea.kr](mailto:kwoh27@korea.kr)].

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### KYRBS in a nutshell

- KYRBS is an ongoing school-based web survey with a stratified, clustered, multistage probability sampling design to monitor health-risk behaviours related with non-communicable diseases and unintentional injuries among Korean adolescents.
- Established in 2005, KYRBS has included nationally representative samples with high participation rates of over 95% of approximately 75 000 sampled students (99% of 800 sampled middle and high schools) in Korea each year.
- Participants have participated in an anonymous self-administered web-based survey and responded to a questionnaire consisting of 15 domains of health-risk behaviours such as tobacco and alcohol use, physical activity, dietary behaviours, mental health, oral health, injuries, substance use, sexual behaviours, internet addiction and violence.
- Reports and microdata are publicly available through the website [<http://yhs.cdc.go.kr>].

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**Conflict of interest:** None declared.

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