SUPPLEMENTARY MATERIAL

Supplementary Description on Survey Weight Developments

1. Survey Weights for Estimation of Screen Positive Prevalence

1.1. Target population for screening survey

The target population included all 49,573 elementary school students of ages 7 through 12 enrolled in the period 2007–2008 in 65 elementary schools in Cheonan City, who were identified through the elementary school system.

1.2. Adjustment for children in nonparticipating schools

For this study, only 49 schools agreed to participate among the 65 schools, covering up to 80.16% (i.e., 38,365 students) of the students in the target population. An evaluation of participating propensity among schools was carried out with a logistic regression model using a number of school characteristics including school location (urban vs. rural), school type (public vs. private), and school size of the enrollments (large vs. small). There were no significant differences between participating and nonparticipating schools on the aforementioned variables. Thus, it allowed a simple weight adjustment procedure for compensating children in nonparticipating schools, where the pre-adjusted weights are expanded by multiplying the inverse of the response rate. That is, the initial weight $w_{ik}^{base}$ of one assigned to each child $k$ in the participating school $i$ in the target population was inflated to $w_{ik}^{base}$ by the factor of 1.2475 ($= 1/0.8016$).

1.3. Adjustment for non-respondents to Korean version of attention deficit hyperactivity disorders (ADHD) rating scale (K-ARS) in participating schools

Of 38,365 students in the participating schools, 30,552 students provided the screener questionnaire and only 29,355 students completed the K-ARS questions (enabling their evaluation of the ADHD screen positive). Without much information from both screener non-respondents as well as partial-respondents, it is considered acceptable to use a simple weight expansion adjustment procedure within schools as follows:

$$A_i^{scr} = \frac{\sum_{k \in A_i^{scr}} w_{ik}^{base}}{\sum_{k \in A_i} w_{ik}^{base}}$$

where $A_i$ is the set of all students in school $i$ and $A_i^{scr} (\subset A_i)$ denotes the set of all students who returned the screener questionnaire to the school. Also, the adjustment factors for screener partial-responding students were computed within schools as follows:

$$A_i^{KARS} = \frac{\sum_{k \in A_i^{KARS}} A_i^{scr} w_{ik}^{base}}{\sum_{k \in A_i^{scr}} A_i^{scr} w_{ik}^{base}}$$

where $A_i^{KARS} (\subset U_i^{scr})$ denotes the set of all students who completed the K-ARS questions in the screener questionnaire. Then, the weight $w_{ik}^{KARS}$ was inflated by the above 2 factors as follows:

$$w_{ik}^{KARS} = \begin{cases} w_{ik}^{base} A_i^{scr} A_i^{KARS} & \text{for the screener completes}, \\ 0 & \text{otherwise} \end{cases}$$

The weight $w_{ik}^{KARS}$ is the estimated number of students in the target population each screener completed student represents. A series of adjustment steps in computing $w_{ik}^{KARS}$ is basically in line with the standard procedures of the survey practice to make a weighted mean (or total) with $w_{ik}^{KARS}$ as an estimate of the mean (or total) of all the students in the target population (1,2).

1.4. Adjustment for association analysis between ADHD risk and socio-demographic covariates

In the meanwhile, for assessing the association between ADHD risk (evaluated as screen positive) and socio-demographic covariates through simple logistic regression analysis, the weights $w_{ik}^{KARS}$ need to be downscaled to make their sum equal to the total number of the screener completed students, that is,

$$w_{ik}^{KARS \text{- SCALD}} = \left( \frac{29,335}{N} \right) \times w_{ik}^{KARS}$$
2. Survey Weights for Clinical Diagnosis of ADHD among 1st–2nd Grade Students

2.1. Adjustment for non-respondents in clinical diagnosis of ADHD among 1st–2nd Grade Screen Positive Students

The 1st and 2nd grade screen-positive children were determined for further evaluation of ADHD by a standard clinical assessment. There were 957 screen-positive children in that grade range. Extensive efforts were made to contact parents of these children and only those parents of 200 children (20.9%) provided consent for diagnostic evaluations. Children whose parents could not be contacted or did not agree to participate were classified as nonparticipants. To compensate for these nonparticipants, response probabilities were first modeled using logistic regression with a set of covariates including school location (urban vs. rural), student’s gender, and education levels and occupational status of father and mother, respectively. The result of a logistic regression model fit for the participation is as follows:

\[
\log \left( \frac{\hat{\phi}_{ik} / (1 + \hat{\phi}_{ik})}{\hat{\phi}_{ik}} \right) = -5.59 + 0.16 \times \text{urban} + 4.43 \times \text{male} - 8.90 \times \text{no.report} \\
+ 0.40 \times \text{edu(father:less)} + 0.18 \times \text{edu(father:high.school)} - 0.65 \times \text{edu(mother:no.report)} \\
+ 0.02 \times \text{edu(mother:less)} - 0.47 \times \text{edu(mother:high.school)} - 0.70 \times \text{no.report} \\
+ 0.39 \times \text{occ(father:no)} - 0.18 \times \text{occ(father:no.report)} \\
+ 0.38 \times \text{occ(mother:no)} - 0.64 \times \text{occ(mother:no.report)},
\]

where the covariates are all indicator variables, “less” stands for “less than high school,” and “occ” stands for “occupation.” Coefficients marked with an asterisk are statistically significant (using 2-tailed Wald test with 0.05 level of significance). Children with a mother working and/or highly educated tends to have a higher likelihood of parental consent to participate in the diagnosis study. Then, the weights for those 200 1st and 2nd grade children who completed the clinical diagnosis of ADHD were inflated by multiplying the inverse of the estimated propensity as follows:

\[
w^\text{diag}_{ik} = \begin{cases} 
\frac{w_{ik}^{\text{KARS}}}{\hat{\phi}_{ik}} & ik \in U_i^c \cap U_{12} \\
0 & \text{otherwise}
\end{cases}
\]

where \(U_{12}\) denotes the set of all 1st and 2nd graders in the target population.

REFERENCES