Disparities in Health-Risk Behaviors, Preventive Care Utilizations, and Chronic Health Conditions for People With Disabilities: The Korean National Health and Nutrition Examination Survey

Ki Dong Ko, MD, MPH,* Ka Yeon Lee, MD,* Belong Cho, MD, PhD, Min Sun Park, MD, PhD, Ki Young Son, MD, MPH, Jung Hwa Ha, PhD, Sang Min Park, MD, PhD


Objective: To examine how disability status is related with health disparities in South Korea.

Design: The study compared 3 indicators of health (health-risk behaviors, preventive health care utilizations, and chronic health conditions) according to the presence of disabilities using the Third Korean National Health and Nutrition Examination Survey, 2005 (KNHANES III).

Setting: We obtained data from the KNHANES III, which is the third nationwide representative study using a stratified, multistage probability sampling design.

Participants: Subjects (N=5475) aged 20 years or older were included in the study; persons with disabilities (n=218) and persons without disabilities (n=5257).

Interventions: Not applicable.

Main Outcome Measures: Nonconditional multiple logistic regression and adjusted mean were used to identify health disparities in health-risk behaviors, preventive health care utilizations, and chronic health conditions.

Results: Subjects with disabilities were more likely to be physically inactive (adjusted odds ratio [AOR]=3.06; 95% confidence interval [CI], 1.71–5.48 for no physical activity; AOR=1.70; 95% CI, 1.19–2.43 for insufficient physical activity) than those without disabilities. Women aged 40 years or older with disabilities were less likely to receive cervical cancer screening services (AOR=0.52; 95% CI, 0.27–0.98). Adults with disabilities had higher proportion of osteoporosis (AOR=2.41; 95% CI, 1.50–3.88), underweight (AOR=2.14; 95% CI, 1.07–4.28), suicidal thoughts (AOR=1.86; 95% CI, 1.35–2.56), and had impaired quality of life (95% CI of adjusted mean, 60.89–65.35 compared to 69.95–70.84 in adults without disabilities).

Conclusions: There exists substantial disability-related health disparities in South Korea. People with disabilities may be the underserved subpopulation demonstrating health disparities. The findings in this study underscore the continued needs in order to reduce health problems and disparities for people with disabilities.

Key Words: Complications; Disabled persons; Health behavior; Healthcare disparities; Preventive health services; Rehabilitation.

© 2011 by the American Congress of Rehabilitation Medicine

THE INTERNATIONAL Classification of Functioning, Disability and Health defines disability as the state of having limitations in body functions, body structures, activities, and participation. Reducing the number of years with disabilities through compression of morbidity and promoting healthy aging has been one of the important goals of public health. Despite these efforts, recent statistics show an increase in the number of people with disabilities worldwide, partly due to prolonged lifespan. In South Korea, more than 2 million people, or about 5% of the total population were enrolled in the National Disability Registry (NDR) in 2009.

Although maintaining good health status is important for all people, it is especially salient for people with disabilities because it can reduce the negative impact of functional limitations. Despite the importance of health in people with disabilities, they have received little attention within the health care system. Several previous studies in western countries showed that people with disabilities often have adverse health behaviors (smoking, alcohol drinking, physical inactivity), receive fewer preventive health care services (cancer screening services, cervical cancer screening services) compared to those without disabilities.
screening, vaccination), and suffer from chronic health conditions such as comorbidities, psychosocial problems, and low health-related quality of life (HRQOL).\textsuperscript{6,17-21} Previous literature provided much evidence on health disparities by ethnicity, education, and income.\textsuperscript{22-25} While little has been known about health disparities for people with disabilities, especially in Asian countries. This article aimed to examine the health disparities by the presence of disabilities in South Korea. Specifically, we examined how disability status was related with 3 indicators of health: health-risk behaviors, preventive health care utilization, and chronic health conditions.

**METHODS**

**Data Source and Study Sample**

This study is based on the Third Korean National Health and Nutrition Examination Survey, 2005 (KNHANES III) conducted by the Korean Ministry of Health and Welfare. This survey is the third nationwide representative study using a stratified, multistage probability sampling design for the selection of household units. The selection was made from sampling units based on geographical area, sex, and age, using household registries. The survey consisted of the Health Interview Survey, the Health Behavior Survey, the Nutrition Survey, and the Health Examination Survey. The Health Interview Survey, the Health Behavior Survey, and the Nutrition Survey were evaluated in the self-administered questionnaires. Interviewers assisted the participants having difficulties in self-administration. Nurses taking the lead in the Health Examination Survey were trained to carry out anthropometric measurements, blood pressure measurement, and serum collection.

We performed cross-sectional analyses of data from the 7597 people who participated in the Health Examination Survey, a part of KNHANES III. Of these, 5501 people were aged 20 years or older. After excluding 26 people who did not respond to the question about the presence of disabilities, 5475 participants (2330 men and 3145 women) were eligible for our analyses.

**Measures**

Self-administered questionnaires were used to gather information about disabilities, socioeconomic status, health-risk behaviors, preventive health care utilizations, and chronic health conditions (comorbidities, psychosocial problems, and HRQOL) from each respondent. The questions about disabilities in the questionnaires included the presence, type, and degree of disabilities. The question, “Are you registered as the disabled on the Korean National Disability Registry?” was used to classify the study sample into dichotomous groups about the presence of disabilities. 5475 participants were eligible for our analyses.

The questions about disabilities in the questionnaires included the presence, type, and degree of disabilities. The question, “Are you registered as the disabled on the Korean National Disability Registry?” was used to categorize the study sample into dichotomous groups about the presence of disabilities. Also, the severity of disabilities was divided into 2 groups: severe disability scored as 1 to 3, and mild disability scored 4 to 6. The Korean NDR is a voluntary self-report sample into dichotomous groups about the presence of disabilities. The respondents were classified into 15 groups and were graded from 1 (very severe) to 6 (very mild) based on the severity of functional losses. Diagnosis and severity of disabilities are made by the respective medical specialist. Types of disabilities are categorized roughly into 3 groups: external physical disability, internal organ disability, and mental disability. Physical impairment (53.2%), brain lesion (10.4%), auditory impairment (10.1%), and visual impairment (9.9%) of external physical disability constitute most disabilities.\textsuperscript{3} Internal organ disability (lung, kidney, heart, liver, intestine, and urinary tract) and mental disability (epilepsy, mental retardation, developmental disability, mental impairment) are also included in the Korean National Disability Registry.\textsuperscript{3}

Socioeconomic characteristics included age, sex, marital status, education level, employment status, and monthly income. Marital status was divided into married and others. Others included single and divorced/separated/widowed. Education level was classified into college or higher, high school, and middle school or lower. Employment status was divided into nonmanual, manual, others (including students or housewives), and no occupation. Income variable was average monthly household income. Income variable was categorized into tertiles (eg, $\leq 1,500,000 South Korean won [KRW], 1,500,000 KRW < income $\leq 2,700,000 KRW, and $> 2,700,000 KRW). Variables assessing the 3 domains of health (health-risk behaviors, preventive health care utilizations, and chronic health conditions) were divided according to the criteria described below. Health-risk behaviors included current smoking, high-risk alcohol consumption, and physical inactivity. Smoking status was categorized as current smoker and nonsmoker (which included ex-smoker and never a smoker). Current smoker included those who smoke regularly or intermittently these days. High-risk alcohol consumption was assessed using the question “how often do you binge drink?” and was categorized into 3 groups according to the frequency of binge drinking. Binge drinking was defined as 7 or more drinks for men and 5 or more for women. One drink contained 10g of alcohol. The 3 groups included: nonbinge drinker who reported binge drinking less than once per month, binge drinker who reported binge drinking 1 to 4 times per month, and frequent binge drinker who reported binge drinking twice or more per week.\textsuperscript{27} Physical inactivity was assessed with the questionnaire based on the International Physical Activity Questionnaire (IPAQ) short form.\textsuperscript{28} No physical activity meant not participating in any combination of walking, moderate-intensity, or vigorous-intensity activities in the past week. Insufficient physical activity denoted that some activity was reported, but not enough to meet the demands (categories 2 [moderate] or 3 [high] of physical activity levels in the IPAQ short-form analysis algorithm) required to achieve health benefits. Categories 2 (moderate) or 3 (high) of physical activity levels are included in sufficient physical activity as a reference.\textsuperscript{29} More details about the IPAQ was described in the IPAQ guidelines.\textsuperscript{28} Respondent’s preventive health care utilizations (cancer screening and influenza vaccination) were also examined in the self-reported questionnaires. Cancer screening included screening for cervical cancer, breast cancer, gastric cancer, and colon cancer. The question on the influenza vaccination was administered for respondents aged 50 and over. Chronic health conditions were assessed through self-reported questionnaires and health examination. Osteoporosis was self-reported with the question “Have you ever had osteoporosis in a lifetime?” Depression was ascertained by asking, “Have you felt sad, unhappy, or desperate for more than 2 weeks, which interfered with the daily activities during the past year?” Suicidal thoughts were identified by asking, “Have you ever thought of killing yourself during the past year?” HRQOL was evaluated with EuroQoL visual analog scale (EQ-VAS) scores.\textsuperscript{30} EQ-VAS was used as a brief, standardized, generic measure of HRQOL to provide a profile of the function and a global health status. The respondent rates his/her HRQOL by drawing a line or placing a mark from the box marked “Your health state today” to the appropriate point. A 3-digit number between 000 (worst imaginable health status) and 100 (best imaginable
health status) is read off the scale, for example, 046 or 069. Health Examination Survey was used to gather information of anthropometric data, blood pressure, and blood tests. Anthropometric data included height, weight, body mass index (BMI), and waist circumference. Underweight and obesity were defined as a BMI of less than 18.5 and a BMI of 25 or higher, respectively. Hypertension was defined as systolic blood pressure of 140mmHg or higher, diastolic blood pressure of 90mmHg or higher, or having medication for hypertension. It is consistent with the Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Blood samples measuring biochemical metabolic markers were collected to estimate hemoglobin, total cholesterol, triglyceride, high density lipoprotein cholesterol, and serum fasting blood glucose level. Then the blood samples were transported to and analyzed in a central, certified laboratory. Diabetes mellitus (DM) was defined as serum fasting blood glucose level of 126mg/dl or higher or receiving treatment for high blood glucose level. Anemia was classified by hemoglobin less than 13g/dl in men and less than 12g/dl in women. The definition of metabolic syndrome was based on the criteria from the modified form in 2005 of the definition suggested by the National Cholesterol Education Program Adult Treatment Panel III. The metabolic syndrome was defined as 3 or more of the following 5 risk factors: (1) abdominal obesity (waist circumference ≥90cm for men and ≥80cm for women), (2) serum triglyceride of 150mg/dl or higher, (3) serum high density lipoprotein cholesterol less than 40mg/dl for men or less than 50mg/dl for women, (4) systolic blood pressure of 130mmHg or higher or diastolic blood pressure of 85mmHg or higher, or receiving treatment for high blood pressure, and (5) fasting blood glucose of 100mg/dl or higher or receiving treatment for high blood glucose level. More details about the Health Examination Survey were described in several other literature sources.

Statistical Analysis

Statistical analyses were performed to demonstrate health disparities by the presence of disabilities. We used binary or polytomous nonconditional multiple logistic regression analyses to compare health-risk behaviors, preventive health care utilizations, and chronic health conditions between 2 groups divided by the presence of disabilities. Adjusted odds ratios (AOR) were calculated after adjusting for age, sex, education level, employment status, marital status, and monthly income. We analyzed the estimates with sampling weights to generalize to the entire population. With 3583 subjects, this study has sufficient statistical power (P>0.9) to detect the differences, given that statistical significance was achieved if the probability was less than 5% (P<0.05). Given the number of regression tests, some of the significant results may have been significant at the individual 0.05 level due to chance. To attain an experiment-wise alpha level of 0.05 on a number of logistic regression tests, an individual alpha would need to be less than 0.05. However we used the individual 0.05 level with a caveat that weak relations may well be unstable and unreplicable. Also, we used an adjusted mean of EQ-VAS scores to compare HRQOL between people with or without disabilities. All statistical tests were performed using STATA, version 10.0.

RESULTS

Baseline Characteristics of the Sample

Descriptive characteristics of the 2 groups (respondents who have a disability versus respondents who do not have a disability) are shown in Table 1. Among the 5475 subjects, 218 (4.0%) were disabled. The group with disabilities was relatively older than those without disabilities. The disabled group included more men than women. In addition, subjects with disabilities were more likely to have a lower education level, lower income, and were less likely to be employed or married. Over 60% of the disabled had middle school or lower education level and the lowest tertile of household income, respectively. The disabled were not employed and married in about 40% and 30% of the population, respectively.

As shown in Table 2, about 64% of the disabled subjects (n=139) had a physical impairment. Visual impairment (9.2%), brain lesion (6.9%), and auditory impairment (6.4%) follow subsequently. Like in the NDR, 4 types of disabilities constitute over 80% of all disabilities.

Differences in Health-Risk Behaviors Between the Groups With Disabilities and Without Disabilities

Table 3 displays differences of behavioral risk factors between the groups. There were no significant differences in current smoking (AOR=0.73; 95% confidence interval [CI], 0.45–1.20) and high-risk alcohol consumption (AOR=1.14; 95% CI, 0.80–1.62 for frequent binge drinking; AOR=0.75; 95% CI, 0.49–1.15 for binge drinking). However, people with disabilities are more likely to have physical inactivity than
Differences in Chronic Health Conditions Between the Groups With Disabilities and Without Disabilities

Chronic health conditions were largely divided into 2 categories (comorbidities and psychosocial problems and HRQOL) (table 5). Compared with people without disabilities, people with disabilities were more likely to suffer from a few comorbidities such as osteoporosis (AOR=2.41; 95% CI, 1.50–3.88) and being underweight (AOR=2.14; 95% CI, 1.07–4.28). Osteoporosis was reported by 17.28% of the disabled, whereas about 9.88% without disabilities reported osteoporosis. Also, being underweight was more prevalent in the disabled (7.55% vs 4.12%). On the other hand, there were no significant differences in hypertension, DM, metabolic syndrome, obesity, and anemia.

As for the psychosocial problems and quality of life, we found that people with disabilities had higher risks of suicidal thought (AOR=1.86; 95% CI, 1.35–2.56), impaired quality of life (95% CI of adjusted mean, 60.89–65.35 vs 69.95–70.84 in adults without disabilities), and tend to have depressive experiences more often. Over a third of the disabled had suicidal thoughts more often.

Table 2: Types and Severity of Disabling Conditions in This Study

<table>
<thead>
<tr>
<th>Types of Disabling Conditions</th>
<th>Mild Disability</th>
<th>Severe Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical impairment*</td>
<td>98</td>
<td>41</td>
</tr>
<tr>
<td>Brain impairment†</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Visual impairment‡</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Auditory impairment§</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Linguistic impairment¶</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Mental retardation§</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Developmental disability¶</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mental impairment§</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Renal function impairment††</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Heart function impairment‡‡</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory function impairment‡§</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Liver function impairment¶</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Facial deformity ‡‡</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Intestinal and urinary tract function impairment***</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Epilepsy***</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Physical impairment: amputation, motor disturbance, joint disability, deformity of limbs, spinal cord injury.
†Brain impairment: brain disability caused by stroke, brain damage, brain palsy.
‡Visual impairment: visual power loss, visual field defect.
§Auditory impairment: hearing disability, disability of the sense of equilibrium.
¶Linguistic impairment: mogilalia, dysphonia.
§§Mental retardation: intelligence quotient<70.
¶¶Developmental disability: autism, developmental impairment.
††Renal function impairment: renal impairment with hemodialysis, kidney transplantation.
‡‡Heart function impairment: heart impairment with daily life limitation.
§§Respiratory function impairment: respiratory impairment with daily life limitation.
¶¶Liver function impairment: liver impairment with daily life limitation.
**Facial deformity: facial deformity caused by head injury, a burn, cancer surgery.
***Intestinal and urinary tract function impairment: intestinal and urinary tract impairment with daily life limitation.

those without disabilities (AOR=3.06; 95% CI, 1.71–5.48 for no physical activity; AOR=1.70; 95% CI, 1.19–2.43 for insufficient physical activity). Over a third of the disabled had no or insufficient physical activity.

Differences in Preventive Health Care Utilizations Between the Groups With Disabilities and Without Disabilities

Women aged 40 and over with disabilities were significantly less likely to receive routine cervical cancer screening than those without disabilities (AOR=0.52; 95% CI, 0.27–0.98), although the likelihood of receiving screening of breast, stomach, and colon cancers was not significantly different between the 2 groups (table 4). Any cancer screening rates in the disabled failed to reach a third. For the influenza vaccination among subjects aged 50 years or older, we found the disabled group would tend to receive more vaccinations. However, the association was not statistically significant (AOR=1.42; 95% CI, 0.96–2.09).

Table 3: Differences in Health-Risk Behaviors Between the Groups With Disabilities and Without Disabilities

<table>
<thead>
<tr>
<th>Health-Risk Behaviors</th>
<th>People Without Disability</th>
<th>People With Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoking</td>
<td>Crude proportion, % (total n) 22.58 (5125) 24.41 (213)</td>
<td>Adjusted† OR (95% CI) 1.0 0.75 (0.49–1.15)</td>
</tr>
<tr>
<td>High-risk alcohol consumption§</td>
<td>Crude proportion, % (total n) 7.04 (5125) 7.04 (213)</td>
<td>Adjusted† OR (95% CI) 1.0 1.14 (0.80–1.62)</td>
</tr>
<tr>
<td>Binge drinking</td>
<td>Crude proportion, % (total n) 22.42 (5125) 16.90 (213)</td>
<td>Adjusted† OR (95% CI) 1.0 0.75 (0.49–1.15)</td>
</tr>
<tr>
<td>Physical inactivity§</td>
<td>Crude proportion, % (total n) 2.26 (5124) 8.45 (213)</td>
<td>Adjusted† OR (95% CI) 1.0 3.06 (1.71–5.48)</td>
</tr>
</tbody>
</table>

Abbreviations: MET, Metabolic equivalent unit; OR, odds ratio.
§Reported as having disability in the National Disability Registry.
†Adjusted using binary or polytomous multiple logistic regression to control for age, sex, education level, employment status, marital status, and monthly income.
§High-risk alcohol consumption was assessed according to the frequency of binge drinking (drinking >7 drinks (men)/>5 drinks (women) in 1 sitting). Binge drinker: binge drinking 1–4 times per month. Frequent binge drinker: binge drinking twice or more per week. One drink contains 10g of alcohol.
§§Physical inactivity was assessed with the questionnaire based on the IPAQ short form. No physical activity: not participating in any combination of walking, moderate-intensity, or vigorous-intensity activities in the past week. Insufficient physical activity: some activities in the IPAQ short form. No physical activity: not participating in any combination of walking, moderate-, or vigorous-intensity activities achieving a minimum of at least 5 days of any combination of walking, moderate-, or vigorous-intensity activities achieving a minimum of at least 5 days of any combination of walking, moderate-, or vigorous-intensity activities achieving a minimum of at least 600MET-min/wk. Category 2: ≥3 days of vigorous activity of at least 20min/d, or ≥5 days of moderate-intensity activity and/or walking of at least 30min/d, or ≥5 days of any combination of walking, moderate-, or vigorous-intensity activities achieving a minimum of at least 600MET-min/wk. Category 3: vigorous-intensity activity on at least 3 days and accumulating at least 1500MET-min/wk, or ≥7 days of any combination of walking, moderate-, or vigorous-intensity activities accumulating at least 3000 MET-min/wk.

Arch Phys Med Rehabil Vol 92, August 2011
DISCUSSION

Using the National Representative Household Survey, this study examined health disparities for people with disabilities in South Korea. Our study is unique in that it took a comprehensive approach to studying health disparities by utilizing a wide range of health measures including health-risk behaviors, preventive health care utilizations, and chronic health conditions (comorbidities and psychosocial problems and HRQOL).

Our analyses resulted in 3 key findings.

First, with regard to health-risk behaviors, our findings showed that people with disabilities were more likely to be physically inactive than those without disabilities. This finding is consistent with previous studies, which showed that adults with disabilities were more likely to lead sedentary lifestyles. As a large proportion of disabled subjects has physical impairment as shown in table 2, it is understandable that they have barriers to engaging in physical activities. However, this physical inactivity may be especially harmful for people with disabilities because they can create new chronic health conditions. The proportion of current smoking or high-risk alcohol consumption was not different between people with and without disabilities. Previous literature has shown higher or similar prevalence for current smoking or risky alcohol consumption in people with disabilities. There may be several reasons for this discrepancy. Recently, national efforts for smoking cessation and moderation in drinking alcohol have been made. People with disabilities might be particularly receptive to these health promotion campaigns or interventions due to their health concern, and attempt to quit smoking or use moderation in drinking alcohol. Also, this result might happen because of the limitation of representativeness associated with this survey question defining the presence of disabilities, relatively small study sample size, and the contents or levels of thought. The adjusted mean of the EQ-VAS scores in the disabled participants was below 70.

Table 4: Differences in Preventive Health Care Utilizations Between the Groups With Disabilities and Without Disabilities

<table>
<thead>
<tr>
<th>Preventive Health Care Utilization</th>
<th>People Without Disability</th>
<th>People With Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical cancer screening (age≥30y)</td>
<td>45.38 (2554) 28.57 (844)</td>
<td>1.0 0.71 (0.41-1.22)</td>
</tr>
<tr>
<td>Cervical cancer screening (age≥40y)</td>
<td>43.22 (1851) 22.86 (70)</td>
<td>1.0 0.52 (0.27-0.98)</td>
</tr>
<tr>
<td>Breast cancer screening (age≥40y)</td>
<td>32.13 (1849) 25.71 (70)</td>
<td>1.0 0.78 (0.43-1.40)</td>
</tr>
<tr>
<td>Gastric cancer screening (age≥40y)</td>
<td>33.75 (3307) 32.26 (186)</td>
<td>1.0 0.94 (0.65-1.36)</td>
</tr>
<tr>
<td>Colon cancer screening (age≥50y)</td>
<td>18.54 (2033) 18.00 (150)</td>
<td>1.0 0.74 (0.46-1.21)</td>
</tr>
<tr>
<td>Influenza vaccination (age≥50y)</td>
<td>62.37 (2033) 71.33 (150)</td>
<td>1.0 1.42 (0.96-2.09)</td>
</tr>
</tbody>
</table>

Table 5: Differences in Chronic Health Conditions Between the Groups With Disabilities and Without Disabilities

<table>
<thead>
<tr>
<th>Chronic Health Conditions</th>
<th>People Without Disability</th>
<th>People With Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension (age≥40y)</td>
<td>35.38 (3386) 47.64 (191)</td>
<td>1.0 1.22 (0.89-1.66)</td>
</tr>
<tr>
<td>DM (age≥40y)</td>
<td>11.17 (3322) 16.67 (180)</td>
<td>1.0 1.19 (0.78-1.82)</td>
</tr>
<tr>
<td>Osteoporosis (age≥40y)</td>
<td>39.16 (3307) 43.18 (176)</td>
<td>1.0 0.94 (0.69-1.30)</td>
</tr>
<tr>
<td>Underweight</td>
<td>9.88 (3392) 17.28 (191)</td>
<td>1.0 2.41 (1.50-3.88)</td>
</tr>
<tr>
<td>Obesity</td>
<td>4.12 (5224) 7.55 (212)</td>
<td>1.0 2.14 (1.07-4.28)</td>
</tr>
<tr>
<td>Anemia</td>
<td>32.58 (5224) 30.66 (212)</td>
<td>1.0 0.76 (0.54-1.08)</td>
</tr>
<tr>
<td>Psychosocial problems and HRQOL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>10.85 (5187) 13.46 (208)</td>
<td>1.0 1.54 (0.95-2.49)</td>
</tr>
</tbody>
</table>

Abbreviation: OR, odds ratio.

*Reported as having disability in the National Disability Registry.
†Receipt of a Papanicolaou test within the past 2 years among women with a uterus.
‡Repeated using multiple logistic regression to control for age, sex, education level, employment status, marital status, and monthly income.
§Receipt of a mammography or breast ultrasonography within the past 2 years among women with breasts.
¶Receipt of a gastroscopy or double-contrast upper gastrointestinal series within the past 2 years.
**Receipt of a colonoscopy or sigmoidoscopy or barium enema within the past 5 years.
§§Suicidal thought in the past year.
††Hemoglobin level.
#BMI
**BMI 25.0kg/m2.
†Self-reported with the question: “have you ever had osteoporosis in your lifetime?”
‡Adjusted using multiple logistic regression to control for age, sex, education level, employment status, marital status, and monthly income.
§Systolic blood pressure 140mmHg or a diastolic blood pressure 90mmHg or having medication for hypertension.
§Rapid plasma glucose 126mg/dl or having medication (oral drug, insulin) for DM.
§Metabolic syndrome following the modified form in 2005 of the definition suggested by the National Cholesterol Education Program Adult Treatment Panel III (2001).
§§Suicidal thought in the past year.
#BMI <18.5kg/m2.
**BMI = 25.0kg/m2.
††Hemoglobin <13g/dl (men) or 12g/dl (women).
†Felt sad, unhappy or desperate for more than 2 weeks, which interfered with the daily activities during the past year.
††Suicidal thought in the past year.
§Quality of life was assessed using the EQ-VAS.
categorical variables about smoking and alcohol drinking. Lastly, smoking and drinking could be affected by cultural differences. Koreans are generally homogenous and conservative in terms of values and customs. People tend to avoid or gossip about those people whose dress codes or behaviors deviate from the social norms. For this reason, people with disabilities are likely to be isolated. Smoking or alcohol drinking in South Korea is closely related with social and interpersonal interactions. Therefore, they might be less likely to engage in smoking and alcohol drinking.

Second, in terms of preventive health care utilizations, those with disabilities were less likely to receive cervical cancer screening services, which is consistent with previous studies. Also, several studies showed a lower likelihood of breast cancer screening among people with disabilities. However, our study did not identify the significant difference in breast cancer screening. This discrepancy might result from the difference of study samples. People with severe functional limitations might be significantly less likely to have breast cancer screening. However, our study sample included more people with mild disabilities than with severe disabilities. Another reason is that our study might fail to reach statistical significance because the sample size was relatively small.

Finally, in terms of comorbidities, people with disabilities were more likely to have osteoporosis and to be underweight, while the prevalence of other comorbidities (e.g., hypertension, DM, metabolic syndrome, obesity, and anemia) was similar in both groups. Several previous studies have reported that adults with disabilities have a greater prevalence of chronic health conditions (e.g., hypertension or DM) than nondisabled adults, which is different from our results. One possible reason for this discrepancy in findings could be that in our study, the participants with disabilities showed a similar proportion of unhealthy behaviors (e.g., smoking, risky alcohol consumption, and obesity problems) with the participants without disabilities. We also found that the presence of disabilities was strongly associated with the presence of suicidal thoughts or impaired HRQOL.

Our findings suggest that the first target for improving the health behaviors of the disabled could be enhancing their physical activity. In South Korea, many exercise facilities linked with community health centers are already present. However, special facilities and programs for the disabled are not yet sufficient. Previous research showed exercise programs tailored for the disabled were associated with improved mobility, functional capacity, balance, as well as increased psychological well-being among participants.

Preventive health care is particularly important to people with disabilities for preventing chronic health conditions and maintaining good health and functioning. In our study, we found that people with disabilities were less likely to receive cervical cancer screening services than those without disabilities. This finding could suggest a need for targeted interventions to promote cervical cancer screening. A number of factors might contribute to disparities in cervical cancer screening of the disabled. These factors include individual, social, and clinical factors. Individual factors are degrees of medical information, economic ability, and physical accessibility. Social factors are functions, such as health system, national program, street condition, transportation system, and economical distribution, bridging individual factors and clinical factors. Clinical factors are disability-knowledgeable staff and disability-adjusted facilities. For example, clinicians may assume that women’s disabilities may limit their sexual activities and that these disabled women are at a low risk for cervical cancer. People with disabilities may experience an earlier onset of chronic health conditions apart from their original impairment. Chronic health conditions of people with disabilities may result from natural consequence of primary disabilities, their participation in adverse health behaviors, and insufficient preventive health care utilizations. These chronic health conditions are likely to cause secondary functional losses, which aggravate their health status. Our analyses showed that subjects with disabilities had a higher prevalence of osteoporosis and being underweight. In 2009, Smith et al demonstrated that osteopenia and osteoporosis were very common in adults with disabilities and that the duration of the disability status was the most important disability-specific independent predictor of bone mineral density. In our study, higher prevalence of osteoporosis of the disabled might partially result from physical inactivity or being underweight. Osteoporosis is a condition defined as low-bone density, predisposing to fracture. Fractures due to osteoporosis can cause chronic pain and further impair mobility. Also, they can result in devastating consequences and carry tremendous morbidity and mortality. This fact is suggesting that especially in the disabled with impaired mobility or who are underweight, bone health monitoring should be included in physicians’ long-term health management plan. Several studies also suggested that the disabled who are underweight should be considered as subjects that require attention in the health care system. Being underweight can be mistakenly ascribed to the disability itself, and thus accepted as part of the condition. However, given its significant link to health, being underweight should be assessed and monitored carefully among people with disabilities. Factors that are related to being underweight among people with disabilities may include medical conditions that affect the metabolism, poverty, decreased muscle mass, difficulty in eating and swallowing, change in eating habits which may be affected by depression, anxiety, or frustration, dependence on others to provide meals, and poor knowledge of nutrition and weight management. The consequences of being underweight may include compromised immunity, impaired learning in children, reduced overall quality of life, and excess deaths. Therefore, nutritional assessment and healthy weight management plans, such as a healthy-balanced diet program, are essential. We also found that disability was strongly associated with a greater risk of suicidal idea and impaired HRQOL, and that the disabled group would tend to have depressive experiences more. Russell demonstrated that the prevalence of suicidal idea among the disabled was significantly higher than people without disabilities. Studies also have shown that adults with disabilities experienced worse subjective health assessment and life satisfaction. Psychosocial problems and low HRQOL can make detrimental effects on physical function among the disabled, partly due to less physical activity and fewer social contacts. Psychosocial programs may be useful for the people suffering from disabilities to improve their mental health, quality of life, and functional outcome.

Study Limitations
There are some limitations to our study. First, this study was based on a cross-sectional survey. Therefore, we did not have information on the temporal relationship and could not draw inferences on causality. Additional prospective studies are needed to determine the causal effect of disability on health measures. Also, this study included all types of disability into 1 category and did not consider their types and severity. Accordingly, effects of the type and severity of disabilities on health-risk behaviors, preventive health care utilizations, and
chronic health conditions were not examined. Future studies should further explore this association using more sophisticated and large data. Second, our study used self-administered questionnaires for much of the information, which may be subject to recall bias. For example, some who experience disabilities may assume they are registered when they are not, and others may not recall or realize that they are included. Third, coverage rate of the NDR is 77.7%, as mentioned earlier. There could be people with disabilities who have not signed up in the NDR, and therefore are classified as subjects without disabilities in this study. Coverage rate of the NDR and the misclassification bias may have reduced this study’s representativeness to the general population. Fourth, the presence of chronic health conditions can be influenced by other factors. For instance, physicians may be more vigilant in the diagnosis of chronic health conditions in the group with disabilities. The opposite might be also possible. Physicians might overlook some chronic health conditions in people with disabilities. Lastly, nonbiometric categorical variables based on single items may have low reliability, have trouble capturing complex characteristics of interest, and thus mask differences that exist.

CONCLUSIONS

A growing number of contemporary efforts, including disability surveillance, support for research, and targeted health programs, have been made to address and ameliorate the health disparities experienced by people with disabilities. However, this nationwide representative study showed disparities in health-risk behaviors, preventive health care utilizations, and chronic health conditions between people with and without disabilities. Our findings underscore the continued need to reduce health problems and disparities for this subgroup at the community or national level.

References


Supplier
a. STATA Corp, 4905 Lakeway Dr, College Station, TX 77845.