

### Chronic Disease and Risk Factors among Nevadans with Disabilities: A 2009 BRFSS Study

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**Abstract:** Previous research has found that people with disabilities are more likely to have chronic diseases (coronary artery disease, stroke, cancer, asthma, diabetes), secondary conditions (high blood pressure, high cholesterol) and risk factors for chronic disease (physical inactivity and obesity) (Havercamp, Scandlin, & Roth, 2004; Kinne, Patrick, & Doyle, 2004; Nosek, Hughes, Petersen et al., 2006; Reichard, Stolzle, & Fox, 2011). The purpose of this study was to conduct a secondary analysis using data from the 2009 Behavioral Risk Factor Surveillance System (BRFSS) to identify differences in chronic disease risk factors and chronic disease/ secondary conditions between adults with and without disabilities in Nevada. Nevadans with a disability were significantly more likely to report having chronic diseases (cancer, coronary artery disease, diabetes, stroke and asthma), to be physically inactive, and overweight/obese and to report high blood pressure and high cholesterol. As a way to reduce chronic disease and secondary conditions among people with disabilities, Healthy People 2010 calls for *all* wellness and treatment facilities to be fully accessible for people with disabilities (US Department of Health and Human Service, 2002). More research is needed to determine if inaccessibility of wellness and treatment facilities is contributing to health disparities found among people with disabilities in Nevada.

**Key words:** People with Disabilities, Health Disparities, Chronic Disease, Risk Factors, Secondary Conditions

In Nevada, 12.9 percent of the non-institutionalized adult population reported having a disability in 2006 (Brault, 2008). This percentage is expected to increase as the baby boomers age. In 2005, 16.5% of people age 21 – 64 reported a disability while 51.8% of those over the age of 65 reported a disability (Brault, 2008). We anticipate a dramatic increase in the number of people 65 years and older beginning in 2011, when the first Baby Boomers reach that age, and lasting through 2029, when the last Baby Boomer turn 65. Nevada has seen considerable growth in the 65 and older population. Between 2000 and 2005,

there was a 24.76% increase in this age group compared to a 5.1% national increase (Colello, 2007). The anticipated increase in the number of people 65 and older and increase in the number of people with disabilities is a public health concern, in Nevada and in the US.

People with disabilities, as a group, experience health disparities or a difference in access to health care, quality of health care or disease outcomes (Drum, Krahn, Peterson, et al., 2009; Dykes & White, 2009). Previous research has found that people with disabilities were more likely to have risk factors for chronic disease and secondary conditions. People with disabilities were more likely to be physical inactive (RR 1.6) and obese ( $p < .001$ ), and were less likely to be questioned about tobacco, alcohol, cocaine, marijuana or other drug use by their physician ( $p < .001$ ) (Havercamp, Scandlin, Roth, & 2004; Iezzoni, McCarthy, Davis, et al., 2000; Reichard, Stolzle, & Fox, 2011). Additionally, people with disabilities were more likely to rate their health as poor compared to people without disabilities ( $p < .001$ ) (Iezzoni, Davis, Soukup, et al., 2002). People with disabilities are more likely to report chronic diseases including: cardiovascular disease, asthma, stroke and diabetes. Chronic diseases have been reported more often by people with disabilities including cardiovascular disease, asthma, stroke, and diabetes (Reichard, Stolzle, & Fox, 2011).

Despite these findings, there is a distinct difference between disability and disease. The World Health Organization's *International Classification of Functioning* (ICF) "defines health and disability as separate constructs, such that a person with a disability can be healthy or unhealthy, just as a person without a disability" (Reichard, Stolze, & Fox, 2011, p. 60). Chapter 6 of Healthy People 2010 points out several misconceptions about disability. One of which is that all people with disabilities also have poor health. An objective of Healthy People 2010 was to promote the health of people with disabilities and eliminate secondary conditions. To achieve this objective, Healthy People 2010 acknowledged that people with disabilities must have full access to programs and facilities that offer wellness and treatment services (US Department of Health and Human Services, 2002), similar to access for people without disabilities.

Although increased rates of chronic diseases and secondary conditions that people with disabilities experience have been identified through analyses of BRFSS data (Armour, Thierry, & Wolf, 2009; Diab & Johnston, 2004; Havercamp, Scandlin, & Roth, 2004), we do not know if the same results are found in Nevada. Because Nevada saw a considerable

increase in the 65 and older population between 2000 and 2005 compared to the nation, would there be a difference in rates of chronic disease or risk factors among Nevadans with disabilities? The purpose of this study was to use 2009 BRFSS data for Nevada to compare risk factors for chronic disease and chronic disease rates among participants with disabilities and participants without disabilities. The specific research questions were: 1) Did people with disabilities have more risk factors for chronic disease than people without disabilities? 2) Did people with disabilities have higher rates of chronic disease / secondary conditions than people without disabilities?

## Methods

Each year, critical chronic disease and risk factor data is gathered through the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an ongoing, state-supported, cross-sectional, random-digit dialing telephone survey that is conducted with non-institutionalized adults 18 years or older. The core component of the BRFSS questionnaire includes questions that are asked of every participant. Chronic disease and risk factor questions are part of the core component. Two disability questions are also part of the core component of the BRFSS questionnaire (CDC, 2009).

This study was a secondary data analysis of data collected in the 2009 Nevada BRFSS survey. Disproportionate stratified sampling (DSS) was employed to provide an adequate sample size for smaller demographic areas in Nevada (CDC, 2009). Data were weighted for population attributes and non-response (CDC, 2009). In 2009, 3840 Nevadans participated in the BRFSS survey. Data were analyzed comparing those who answered no to both disability questions to those who answered yes to the disability question two. The two disability questions were: 1) "are you limited in any way in any activities because of physical, mental or emotional problems?" (CDC, 2009) and 2) "do you now have any health problem that requires you to use special equipment such as a cane, a wheelchair, a special bed or a special telephone?" (CDC, 2009). Because previous research has shown that people with physical disabilities were more likely to report chronic diseases, only question two was selected for identifying people with mobility disabilities (Reichard, Stolzle, & Fox, 2011). Participants answering yes to this question would have been more

likely to have mobility disabilities. In 2009, 372 participants answered yes to disability question two, 3326 answered no to disability questions one and two.

SAS 9.2 was used for the statistical analysis. Weighted descriptive statistics were performed to describe the characteristics of the population by gender, age, race, education, income and access to health care. PROC SURVEYFREQ was utilized to conduct Rao Chi square test to determine statistically significant differences in proportions of participants with disabilities compared to participants without disabilities with regard to: 1) descriptive statistics, 2) risk factors and 3) chronic diseases using PROC SURVEYLOGISTIC was used to perform multiple logistic regression to calculate crude and adjusted odds ratios for dichotomous dependent variables for: 1) risk factors and 2) chronic diseases comparing participants with disabilities to participants without disabilities. Adjusted odd ratios included age, income, education, race, gender and access to health care as covariates. Dependent dichotomous (yes/no) variables were physical activity, smoking, binge drinking, high blood pressure, high cholesterol, fruit and vegetable consumption, obese / overweight, stroke, cardiovascular disease, asthma, cancer and diabetes.

## Results

Descriptive statistics of the sample are provided in Table 1. Compared to participants without disabilities, participants with disabilities were significantly more likely to be in the older age bracket (55+) than people without disabilities ( $p < 0.001$ ) and to be in the lower income bracket ( $< \$20,000$ ) ( $p < 0.001$ ). Both those with disabilities and those without disabilities had an approximately equal distribution of male and female participants and both groups reported a high prevalence of some college education (58.2% and 63.6% respectively). There was not a significant difference in access to health insurance between people with disabilities and those without disabilities (86.6 and 80.2, respectively). People with disabilities were more likely to have had a check-up in the past 12 months, although that finding was not significant ( $p = .07$ ).

**Table 1: Descriptive Statistics – People with Disabilities and People without Disabilities in Nevada 2009**

| Variable                     | People with Disabilities (n=) | People without Disabilities (n=) | Rao-Scott |         |
|------------------------------|-------------------------------|----------------------------------|-----------|---------|
|                              | Weighted %                    | Weighted %                       | $\chi^2$  | p       |
| <b>Health Care Access</b>    | 86.6                          | 80.2                             | 2.65      | .10     |
| <b>Check-up, 12 months</b>   | 86.0                          | 78.8                             | 3.25      | .07     |
| <b>Gender</b>                |                               |                                  | .28       | .59     |
| <b>Male</b>                  | 48.9                          | 50.9                             |           |         |
| <b>Female</b>                | 51.1                          | 49.4                             |           |         |
| <b>Age</b>                   |                               |                                  | 30.3      | <0.001* |
| <b>18-24</b>                 | 1.1                           | 8.0                              |           |         |
| <b>25-49</b>                 | 33.0                          | 53.8                             |           |         |
| <b>&gt;50</b>                | 65.9                          | 38.2                             |           |         |
| <b>Race</b>                  |                               |                                  | 3.9       | .27     |
| <b>White</b>                 | 78.1                          | 71.2                             |           |         |
| <b>Black</b>                 | 5.4                           | 4.6                              |           |         |
| <b>Hispanic</b>              | 10.1                          | 15.4                             |           |         |
| <b>Other</b>                 | 6.4                           | 8.8                              |           |         |
| <b>Income</b>                |                               |                                  | 55.7      | <0.001* |
| <b>&lt;\$20,000</b>          | 35.0                          | 12.0                             |           |         |
| <b>\$20K to &lt;\$35K</b>    | 25.1                          | 19.1                             |           |         |
| <b>\$35k to &lt;\$75K</b>    | 24.4                          | 33.0                             |           |         |
| <b>&gt;\$75K</b>             | 15.5                          | 35.8                             |           |         |
| <b>Education</b>             |                               |                                  | 3.1       | .21     |
| <b>&lt; High School Grad</b> | 11.0                          | 7.2                              |           |         |
| <b>High School Grad</b>      | 30.8                          | 29.2                             |           |         |
| <b>Some College</b>          | 58.2                          | 63.6                             |           |         |

\* = Statistically Significant  $p \leq 0.05$

Crude odds ratios and adjusted odds ratios were calculated for risk factors, chronic diseases and secondary conditions. Variables for risk factors included: smoking, binge drinking, physical inactivity, fruit and vegetable consumption and overweight/obesity. Variables for chronic disease and secondary conditions included: diabetes, coronary artery disease, stroke asthma, cancer, hypertension and hypercholesterolemia. Adjusted odds ratios were calculated controlling for gender, age, race, education, income and access to health care. Those variables that were significantly different

between groups prior to adjusting for covariates remained significant after adjustments. Participants with disabilities reported a significantly higher prevalence of all chronic diseases and secondary conditions and were 3.01 (95% CI 1.90 – 4.75) times more likely to report being diabetic, 1.89 (95% CI 1.17 – 3.06) times more likely to have coronary artery disease, 3.66 (95% CI 2.29 – 5.86) times more likely to have had a stroke, 3.41 (95% CI 1.81 – 6.46) times more likely to have ever been diagnosed with asthma, and 2.17 (95% CI 1.32 – 3.55) times more likely to have had cancer (Table 2).

**Table 2: Chronic Disease and Secondary Conditions - People with Disabilities compared to People without Disabilities in Nevada 2009**

| Variable                   | Crude OR | Crude 95% CI | Adjusted OR | Adjusted 95% CI |
|----------------------------|----------|--------------|-------------|-----------------|
| <b>Diabetic</b>            | 8.33     | 5.53-12.55*  | 3.01        | 1.90-4.75*      |
| <b>CAD</b>                 | 7.23     | 4.62-11.31*  | 1.89        | 1.17-3.06*      |
| <b>Stroke</b>              | 7.83     | 4.76-12.90*  | 3.66        | 2.29-5.86*      |
| <b>Asthma</b>              | 2.34     | 1.55-3.65*   | 3.41        | 1.81-6.46*      |
| <b>Cancer</b>              | 2.65     | 1.77-3.96*   | 2.17        | 1.32-3.55*      |
| <b>High Blood Pressure</b> | 3.82     | 2.69-5.43*   | 6.53        | 3.72-11.47*     |
| <b>High Cholesterol</b>    | 2.22     | 1.56-3.18*   | 2.44        | 1.51-3.93*      |

\* = significant finding

Participants with disabilities were 3.01 (95% CI 1.90 – 4.75) times more likely to be physically inactive and 1.88 (95% CI 1.14-3.10) times more likely to be overweight or obese (Table 3). Additionally, people with disabilities were 6.53 (95% CI 3.72 – 11.47)

times more likely to have high blood pressure and 2.44 (95% CI 1.51 – 3.93) times more likely to have high cholesterol. Smoking, binge drinking and fruit and vegetable consumption were similar between Nevadans with and without disabilities.

**Table 3: Risk Factors - People with Disabilities Compared to People without Disabilities in Nevada – 2009**

| Variable                            | Crude OR | Crude 95% CI | Adjusted OR | Adjusted 95% CI |
|-------------------------------------|----------|--------------|-------------|-----------------|
| <b>Smoker</b>                       | 0.95     | 0.62-1.46    | 0.99        | 0.62-1.56       |
| <b>Binge Drinker</b>                | 0.60     | 0.28-1.26    | 0.91        | 0.53-1.54       |
| <b>Physically Inactive</b>          | 3.25     | 2.16-4.89*   | 3.01        | 1.90-4.75*      |
| <b>Fruit /Vegetable Consumption</b> | 1.00     | 0.67-1.51    | 1.02        | 0.64-1.61       |
| <b>Over Weight/Obese</b>            | 1.53     | 1.06-2.19*   | 1.88        | 1.14-3.10*      |

\* = significant finding

### Discussion

Participants with disabilities in this study had higher odds of reporting chronic diseases (diabetes, asthma, cancer, coronary artery disease and stroke) than participants without disabilities. This difference remained significant after adjusting for age, income and other covariates. At the same time, participants with disabilities had greater adjusted odds ratios for being physically inactive and overweight/obese. These findings reinforce those of previous studies, which also showed people with disabilities having significantly more chronic disease / secondary conditions, obesity and physical inactivity (Haverkamp, Scandlin, & Roth, 2004; Kinne, Patrick, & Doyle, 2004; Nosek, Hughes, Petersen et al., 2006; Reichard, Stolzle, & Fox, 2011). These findings raise serious public health concerns. While a causal pathway cannot be determined from this study, it

does show that Nevadans with disabilities have “higher risk for adverse health outcomes” than Nevadans without disabilities (Reichard, Stolzle, & Fox, 2011p. 64). Particularly, Nevadans with disabilities are much more likely to be physically inactive and overweight / obese which are two risk factors for chronic diseases and secondary conditions. Also of note, people with disabilities were equally likely to smoke, binge drink and eat five servings of fruit and vegetables per day as those with no disability. This finding does not negate smoking, binge drinking and diet as potential risk factors for chronic disease. Rather, it emphasizes the contribution that physical inactivity and overweight/obesity make towards the chronic disease process.

Previous research has shown that regular physical activity is an important component for the prevention

of chronic disease and for improvements in overall health (O'Donovan, Blazevich, Boreham, et al., 2010; Vuori, 2010). Specifically, regular physical activity helps to reduce the risk of developing heart disease, stroke, diabetes, high blood pressure and high cholesterol and has been shown to have a positive impact on pulmonary function. Moderate physical activity facilitates disease prevention and improved general health (Sothorn, Loftin, Suskind, et al., 1999). Obesity has also been linked to chronic diseases, especially diabetes, coronary artery disease, stroke, cancer and pulmonary compromise and has been identified as one of the most modifiable risk factors for chronic disease (Nejat, Polotsky, & Pal, 2010).

Although there is an understanding of health benefit and disease prevention that accompanies physical activity and weight management, the majority of health promotion programs have not been tailored for individuals with physical disabilities (Rimmer, 1999; Rimmer & Braddock, 2009). The focus for health promotion programs for people with disabilities should be the reduction of secondary conditions, chronic diseases, and improvements in general health. Additionally, health promotion programs and wellness interventions need to consider the unique needs of people with disabilities. Objective 6.10 of Healthy People 2010 was to increase the accessibility for people with disabilities not only to health programs but wellness programs and facilities as well.

Previous research has shown that fitness facilities lack accessibility for people with disabilities. One study found that of the 35 fitness facilities evaluated, all facilities had low to moderate accessibility for people with disabilities (Rimmer, Riley, Wang, et al., 2005). Rimmer, Riley, Wang, et al. (2004) identified the most common barriers to participation in fitness and recreational facilities for people with disabilities as: a lack of adaptive and/or accessible equipment, fitness professionals not having knowledge about disabilities or how to adapt fitness programs to accommodate people with disabilities and a lack of policies regarding people with disabilities. Additionally, people with disabilities perceived fitness and recreational facilities to be unfriendly environments due to the negative attitudes of the employees and members without disabilities (Rimmer, Riley, Wang, et al., 2004).

Improvements in accessibility of fitness facilities can be achieved without financial hardship to the organization. An arm ergometer with a removable seat for wheelchair accessibility is no more expensive than other pieces of cardiovascular exercise equipment and can be used by facility members with and without disabilities. Improvements in access to

weight equipment can be achieved by allowing adequate spacing around pieces of equipment for transfer from a wheelchair (36 x 48 inches), having a seat on the equipment that is  $\geq 18$  inches wide and having a 'seat belt' for improved stability (Rimmer, Riley, Wang, et al., 2004). Fitness staff can be trained to assist a member with disabilities with transferring from a wheelchair to exercise equipment. They can also improve the friendliness of the facility by asking members with disabilities if they need assistance, looking them in the eye when they speak to them and allowing service animals and personal assistances into the facility (Rimmer, Riley, Wang, et al., 2004). Currently there is a dearth of literature regarding participation in health promotion programs by people with disabilities and the resulting outcomes (White, Gonda, Peterson, & Drum, 2011). Studies that have been conducted evaluating exercise program participation of people with disabilities show positive outcomes such as reduced amounts of obesity and increased activity levels (Kilmer, Wright, Aitkens, 2005; Olney, Nymark, Brouwer, et al., 2006; Rimmer, Rauworth, Wang, et al., 2009). Because people with disabilities are less likely to participate in physical activity outdoors due to environmental barriers (uneven, damages, narrow or non-existent sidewalks; curbs without ramps; terrain with too steep a grade, etc), accessibility of fitness facilities becomes increasingly important and may present a viable alternative for physical activity (Rimmer, Riley, Wang, et al., 2005). Chronic disease rates are higher for people with disabilities compared to those without and thought to be one of the primary causes of higher health care costs for people with disabilities (Reinhard, Stolze, & Fox, 2011). Targeted health promotion programs and improved accessibility of fitness facilities may help improve health outcomes for people with disabilities (White, Gonda, Peterson, & Drum, 2011) and possibly reduce health care costs.

### Limitations

There were a number of limitations with this cross-sectional study. Causation cannot be determined. We cannot determine if disability caused chronic disease or if chronic disease caused the disability. There was also a possibility of bias resulting from self-reported information including inaccurate recall. The BRFSS is a household telephone survey and in 2009 did not include cell phone numbers in the general survey. People without a home telephone or those who use a cell phone as their home phone were excluded from the general survey with no direct method for correcting for those who do not have a home telephone (CDC, 2009). This may have resulted in an underestimation of the true prevalence of disability in this group. The BRFSS does not

include institutionalized adults which also may have led to an underestimation of disability, chronic diseases / secondary conditions and risk factors in the general population. Finally, this study is limited by the questions asked in the BRFSS survey. Disability questions are broad and do not identify specifics about the participant's disability type or severity. A person with a disability that does not impact mobility might be more likely to participate in physical activity than a person with mobility limitations. A person with a hearing disability may be more likely to be physically active than a quadriplegic person, but this cannot be determined from this study.

### Conclusion

This study raises questions for further research in Nevada. To date, no study has been conducted to determine the accessibility of community based or privately owned fitness centers. Do health promotion programs in Nevada consider the unique needs of Nevadans with disabilities? Do people with disabilities in Nevada have the opportunity to be physically active? Do they have access to accommodating cardiovascular equipment and weight equipment in community based or privately owned fitness centers? Do they have access to fitness instructors or personal trainers who are experienced in working with people with disabilities? Is their only option for physical activity clinically based rehabilitation centers?

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