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Using state-issued identification cards for obesity tracking



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Summary Obesity prevention has emerged as one of public health's top priorities. Public health agencies need reliable data on population health status to guide prevention efforts. Existing survey data sources provide county-level estimates; obtaining sub-county estimates from survey data can be prohibitively expensive. State-issued identification cards are an alternate data source for community-level obesity estimates. We computed body mass index for 3.2 million adult Oregonians who were issued a driver license or identification card between 2003 and 2010. Statewide estimates of obesity prevalence and average body mass index were compared to the Oregon Behavioral Risk Factor Surveillance System (BRFSS). After geocoding addresses we calculated average adult body mass index for every census tract and block group in the state. Sub-county estimates reveal striking patterns in the population's weight status. Annual obesity prevalence estimates from identification cards averaged 18% lower than the BRFSS for men and 31% lower for women. Body mass index estimates averaged 2% lower than the BRFSS for men and 5% lower for women. Identification card records are a promising data source to augment tracking of obesity. People do tend to misrepresent their weight, but the consistent bias does not obscure patterns and trends. Large numbers of records allow for stable estimates for small geographic areas.

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Public health agencies need reliable local data on population health status to guide and evaluate prevention efforts. Obesity prevention is one of the most pressing issues in public health today. Over one-third of U.S. adults are obese [1]. Obesity greatly increases the risk for many diseases and lowers life expectancy. The Behavioral Risk Factor Surveillance System (BRFSS) is the standard data source for state and county obesity estimates [2]. State Departments of Motor Vehicles (DMV) are a potential source of data to augment obesity tracking at a sub-county scale [3–5]. Most states issue driver licenses and identification cards (DMV records) that contain information on age, sex, height, weight, and home address [6]. These data can be used to generate population-based obesity estimates for small areas.

Self-reported data are subject to bias. The BRFSS, a random-digit-dial telephone survey, underestimates obesity prevalence [7] because people tend to overestimate their height and underestimate their weight [8,9]. Though the estimates are conservative, the BRFSS remains one of the primary sources for adult obesity estimates [2]. A few studies have compared direct height and weight measurements to self-reported information on driver licenses and found people do tend to overreport height and underreport weight. On average, driver licenses underestimated weight by 4.74 kg and overestimated height by 2.06 cm for 143 Asian-American women in Hawaii [10]. Another study of 480 women under the age of 45 found driver licenses underestimated weight by 5.9 kg and overestimated height by 0.28 cm, though there were strong correlations between reported and measured values [11]. Finally, a study of 512 university students found driver licenses overestimated height by an average 0.57 cm for women and 1.32 cm for men, but did not compare weights [12].

Even if height and weight information on a driver license are predictably biased, DMV records may still be useful for population-based monitoring of obesity. However, no published study has yet compared self-reported data from DMV records to population-level weight status estimates. The first objective of this study was to compare weight status estimates from DMV records to the Oregon BRFSS. BRFSS data allow for county-level obesity estimates. Because address information is included in DMV records, weight status estimates can be created for areas smaller than counties. The second objective of this study was to use DMV records to produce statewide estimates for census tracts and block groups. This study was part of a larger evaluation we reported on previously [13].

Data for this study were provided by the Driver and Motor Vehicle Services Division of the Oregon Department of Transportation. The cost was about \$900 for 3.5 million records issued or renewed between 2003 and 2010. Driver licenses and ID cards are issued for 8 years. Data fields include home address with zip code, date of birth, sex, height (in feet and inches), weight (in pounds), and the dates of the original card issue, the most recent card issue, and the card expiration. Race and ethnicity data are not collected by Oregon's DMV. Body mass index (BMI), expressed in units of kg/m^2 , is the standard measure used for population-based surveillance of weight status. We computed BMI for each record and used conservative criteria to remove outliers in height (less than four feet or greater than seven feet), weight (less than 50 pounds or greater than 600 pounds), and BMI (less than $14.5 \text{ kg}/\text{m}^2$ or greater than $65 \text{ kg}/\text{m}^2$) ($n = 906$, 0.02%).

We geocoded addresses and assigned DMV records to counties, census tracts and block groups based on 2010 Census boundaries. Counties are the largest political subdivision of states; Oregon contains 36 counties. The U.S. Census Bureau splits counties into tracts, which generally have between 2500 and 8000 residents. Tracts are divided into block groups, which generally contain between 600 and 3000 people [14]. Over 95% of the records could be geocoded to a census block group. We also aggregated DMV records into 0.25 mile² areas (0.5 mile by 0.5 mile). We computed age-adjusted mean BMI estimates for every census block group, tract, county and 0.25 mile² area in Oregon, as well as for the entire state.

To facilitate comparison with the BRFSS, the DMV sample was restricted to 3.2 million records issued to people ages 18–84 years. Both DMV and BRFSS estimates were age-adjusted to the 2010 U.S. population using the same age categories: 18–34 years, 35–64 years and 65+ years. We used *t* tests to compare annual age-adjusted estimates of mean BMI and obesity prevalence from DMV records to the BRFSS. SAS 9.2, SPSS 19.0, and Microsoft Excel 2007 were used for analysis. ESRI ArcGIS 10.0 was used to geocode DMV data and create maps. Oregon Public Health Division's Project Review Committee deemed this project to be core public health practice.

Annual DMV obesity prevalence estimates ($\text{BMI} > 30 \text{ kg}/\text{m}^2$) for men averaged 17.9% lower than estimates from the BRFSS ($p < 0.001$). For women, obesity prevalence estimates averaged 30.8% lower than the BRFSS ($p < 0.001$). Age-adjusted mean BMI for men from DMV records averaged $0.52 \text{ kg}/\text{m}^2$ (1.9%) lower than the BRFSS

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