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Variation in Vaccination Data Available at School Entry Across the United States

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Objectives. To compile substate-level data on US school-age children's vaccination rates.

Methods. For states that did not have suitable data online, in 2015 we submitted information requests to the state health department and followed up with the state's Freedom of Information Act when necessary.

Results. The accessibility, scale, and types of vaccination data varied considerably. Whereas 26 states provided data online, 14 released data only after a Freedom of Information Act request. School or school-district data were available for 24 states, 19 at the county level, 2 at the health department level, and 6 provided no substate-level data.

Conclusions. Effective vaccination policy requires a robust understanding of vaccination behavior. Some states make it difficult to access data or provide low-resolution data of limited value for identifying vaccination behavior. (*Am J Public Health*. 2016;106:2180–2182. doi:10.2105/AJPH.2016.303455)

The relationships among vaccination recommendations and policies, vaccine uptake, and the rates of exemptions from school-entry vaccination requirements are of great interest to public health officials. This information is especially valuable when it allows the identification of specific communities where vaccination coverage rates are below recommended thresholds and populations may be more vulnerable to outbreaks.

State-level data are helpful for identifying national trends in kindergarten vaccination and exemption rates,[1] but they do not allow examinations of within-state differences in vaccination coverage. Vaccination-related behavior has proven to be highly spatially variable within states or larger regions.[2–4] Communities with very low vaccination rates are often located in close proximity to communities with much higher vaccination rates. State-level data, or even county-level data, on vaccination coverage and exemption rates may not allow the identification of the most at-risk communities. Our ability to improve scientific knowledge about of the links between vaccination coverage rates and infectious disease outbreaks is dependent on having access to data at a fine spatial resolution. The challenges associated with accessing spatial data about immunization have been described for some individual states,[4,5] but the availability of data has not been systematically examined across the country.

METHODS

As part of our ongoing research about vaccination behavior in the United States, we attempted to collect substate-level school vaccination or exemption data for all 50 states and the District of Columbia. Our data collection process began in July 2015, and we concluded our efforts in September 2015. We began by accessing all official data available

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TABLE 1—US Vaccination Data Availability for Kindergarten Students by Scale, Source, Most Recent Year, Completeness of Vaccine Data, and Exemption Information for Each State as of September 2015

Scale	Web (n = 26)	Upon Request (n = 5)	FOIA (n = 14) or NA (n = 6)
School (n = 20)	Arizona (2014, SV, SE) California (2014, SV, SE) Colorado (2015, TV, TE) Idaho (2014, SV, SE) Illinois (2013, SV, SE) Maine (2014, SV, SE) Michigan (2014, TV, SE) Missouri (2015, SV, none) New York (2012, SV, SE) North Dakota (2014, SV, SE) Oregon (2015, SV, SE) Vermont (2013, SV, none) Virginia (2014, TV, SE) Washington (2013, TV, TE)	. . .	Arkansas (2014, SV, TE) Georgia (2014, TV, SE) Nevada (2014, SV, SE) Ohio (2014, TV, TE) Pennsylvania (2014, SV, SE) Wisconsin (2012, TV, SE)
School district (n = 4)	Texas (2013, TV, SE)	Tennessee (2014, TV, SE)	Utah (2013, TV, TE) Wyoming (2014, SV, SE)
County (n = 19)	Connecticut (2013, SE, SE) Florida (2014, TV, SE) Indiana (2015, SV, none) Kansas (2012, SV, none) Kentucky (2012, SV, SE) Massachusetts (2013, SV, SE) Minnesota (2013, SV, SE) New Jersey (2013, TV, SE) New Mexico (2014, TV, TE) South Dakota (2014, SV, TE) West Virginia (2013, SV, SE)	Iowa (2013, TV, SE) Louisiana (2014, TV, SE) Maryland (2013, SV, SE)	Alabama (2014, TV, SE) District of Columbia (2014, SV, none) North Carolina (2013, TV, TE) Oklahoma (2014, TV, none) South Carolina (2014, TV, none)
Health department (n = 2)	. . .	Nebraska (2014, SV, SE)	Mississippi (2014, TV, TE)
State (n = 6)	. . .	. . .	Alaska (2014, TV, none) Delaware (2014, TV, none) Hawaii (2014, TV, none) Montana (2014, TV, none) New Hampshire (2013, TV, SE) Rhode Island (2014, TV, none)

Notes. FOIA = Freedom of Information Act; NA = not available; SE = specific types of exemptions; SV = rates for specific types of vaccination; TE = total exemptions; TV = total vaccination compliance.

online. For states without online data sets and those with Web sites stating that a formal request for data had to be submitted, we made direct requests to state departments of public health. Finally, for states that did not respond to our information requests, we filed formal requests under the state-level Freedom of Information Act (FOIA). We encountered numerous difficulties with our attempts to compile a usable nationwide geographic information system of school-entry vaccination behaviors.

RESULTS

The availability of data we were able to access by state is summarized in Table 1. All data requested and received were in aggregate, with no individual-level data. Information about student vaccination rates was available online for 26 states. Of these, 14 provided school-level data, 1 provided school district–level data, and 11 provided county-level data. Six states provided data directly via e-mail after a direct request. For the remaining 18 states and the District of Columbia, we filed requests for substate-level data by using the state's FOIA. Of these 19 entities, 6 provided school-level data, 2 provided school district–level data, and 5 provided county-level data (including the District of Columbia, which provided ward-level data).

Some states required modestly restrictive data use agreements to be signed. One state initially cited the Health Insurance Portability and Accountability Act of 1996 as a reason to deny the FOIA request, but provided school district–level data after they consulted legal experts. The remaining 6 states either never responded to written requests or telephone calls, or they were not able to provide any suitable data about substate-level vaccination rates because they rely on sampling rather than a full census for their published state-level vaccination rates. In total, we were able to acquire school-level data from 20 states, school district–level data from 4 states, county-level data from 18 states and the District of Columbia, and health department data (generally several counties in size) from 2 states.

DISCUSSION

There was wide variety in both the completeness of the vaccination information provided and the spatial resolution of the available data. About half of the states provided only information about the proportion of students who were "fully immunized," "in compliance," or "up-to-date" with state standards. The remainder of states provided vaccination rates for specific types of vaccines or diseases. Among states that provided data about the proportion of students who had received the required doses of specific vaccines, some provided data by disease (such as reporting separately for measles and mumps) and others provided data by vaccine (such as reporting uptake of the measles, mumps, and rubella vaccine).

About one third of the states provided only an overall exemption rate for each locality, whereas the other states provided separate rates for medical exemptions and for various types of nonmedical exemptions (such as personal, philosophical, or religious exemptions). A few states provided specific exemption reasons for each type of vaccine, whereas most provided just 1 overall exemption rate across all vaccines. Some included separate details about "permanent" exemptions and those that were "temporary," "provisional," or "conditional." The analysis challenge of these data grows with the considerable variability among states in the types of nonmedical exemptions that are allowed or banned,[4,6,7] as well as the significant differences in how many months after enrollment kindergarten students with nonpermanent exemptions are given to become compliant.

The most recent vaccine or exemption data (as of September 2015) available by state ranged from as recent as the start of the 2015–2016 school year to as old as 2012. Because policies related to school-entry vaccination requirements and allowable exemptions change often, old information hinders evaluations of the effectiveness of recommendations and compliance with policies. A related limitation is that many states provided only data for the most recent year available even though we had requested data for as many years as was readily available. Also, although most states reported data for kindergarten students, one reported only for "younger children" and several reported on older children or several grades' worth of children.

PUBLIC HEALTH IMPLICATIONS

The variance in available data across temporal and spatial scales combines with differences in vaccination measurement to make cross-state substate analysis of vaccination behavior challenging, if not impossible. Whereas data from the National Immunization Survey, which primarily focuses on vaccination coverage among preschool children aged 19 months to 35 months, are available at the state level for all states, substate National Immunization Survey data are not compiled.[5] Although states have the legal right to enact their own specific school-entry vaccination requirements, uniform reporting criteria across the states would be very helpful in getting a national picture of vaccination behavior, and we would encourage the Centers for Disease Control and Prevention or another entity to undertake such an initiative. Comparable data at the school level would be incredibly useful for identifying spatial variability in vulnerability to outbreaks of vaccine-preventable diseases, and could provide significant gains in public health knowledge, practice, and policy. AJPH

CONTRIBUTORS

T. F. Leslie supervised the study and collected the data. E. J. Street led the analysis of the data. P. L. Delamater, K. H. Jacobsen, and Y. T. Yang contributed to the interpretation of the results and the writing of the article.

HUMAN PARTICIPANT PROTECTION

George Mason University's human participants review board exempted this study from approval because it used de-identified administrative data.

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