Researchers develop method to better estimate vaccine coverage

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Immunizations are a valuable tool for controlling infectious diseases among populations both in the U.S. and globally. Routine immunizations and supplemental immunization activities, such as immunization campaigns, are designed to provide immunization coverage to entire populations. Current measurements used to determine the success and rates of immunization can be flawed and inconsistent. According to a new study led by researchers from the Johns Hopkins Bloomberg School of Public Health, estimates of vaccination coverage can be significantly improved by combining administrative data with survey data. The results are featured in the October 2011 issue of *PLoS Medicine*.

"Reliable estimates of vaccination coverage are key to managing population immunization status," said Justin Lessler, lead author of the study and an assistant professor with the Bloomberg School's Department of Epidemiology. "Currently, the performance of routine and supplemental immunization activities is measured by the administrative method, which leads to coverage estimates that are often inconsistent with the proportion reporting vaccination in cross-sectional surveys. Furthermore, administrative coverage does not tell you how many people are systematically missed by vaccination activities. We estimated that the size of the population never reached by any activity was high in Sierra Leone and Madagascar, 31 percent and 21percent respectively. But it was much lower in Ghana, only 7 percent. "

The widely used administrative method divides the number of doses distributed by the size of the target population. Lessler, along with

colleagues from Johns Hopkins, University of Oxford, Epicentre, and Princeton University developed a method for estimating the effective coverage of vaccination programs using cross-sectional surveys of vaccine coverage combined with administrative data. The method was applied using demographic health survey and administrative coverage data reported to the WHO from measles vaccinations in Ghana, Madagascar and Sierra Leone. They found estimates of routine supplemental immunization activities coverage are substantially lower than administrative estimates for Madagascar and Sierra Leone, and only slightly lower for Ghana. In addition, their estimates of routine coverage are, in general, lower than WHO and United Nations Children's Fund (UNICEF) estimates.

"This method not only attempts to correct coverage estimates, but also distinguishes between issues of overall coverage and vaccine within activity inefficiencies. For our technique to be useful, countries must have cross-sectional data on vaccine coverage for children across a range of ages, some of an age where they have been exposed to multiple vaccination activities," said Derek Cummings.

"Estimates of the inefficiency of past vaccination activities and the proportion not covered by any activity allow us to more accurately predict the results of future activities and provide insight into the ways in which vaccination programs are failing to meet their goals," adds Lessler.

More information: Lessler J, Metcalf CJE, Grais RF, Luquero FJ, Cummings DAT, et al. (2011) Measuring the Performance of Vaccination Programs Using Cross-Sectional Surveys: A Likelihood Framework and Retrospective Analysis. PLoS Med 8(10): e1001110. doi:10.1371/journal.pmed.1001110